

The mental health impact of recession and welfare reform in England between 2008 and 2013.

‘Thesis submitted in accordance with the requirements of the University of Liverpool
for the degree of Doctor in Philosophy by Benjamin Richard Barr

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Declaration

This thesis is my own work. The material contained in this thesis has not been presented, nor is currently being presented, either wholly or in part for any other degree or qualification.

Dedication

I would like to dedicate this thesis to my mum who has shown me that life is a discovery.

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Abstract.

Background: Welfare benefit policies have important implications for public health. They aim to reduce the risk of poverty, promote employment for people who can work, and help maintain the livelihood of people who are not able to work due to unemployment, disability or old age. They may help reduce the economic and health consequences of recessions, however the 2008 recession and subsequent rise in government debt has also led to welfare reforms that reduce access to and adequacy of welfare benefits. This thesis uses the recent recession and subsequent welfare reforms in the UK as natural experiments to investigate the relationship between recession, welfare benefit policies and mental health.

Study design: I use routine administrative and survey data for England and systematic review methods to investigate the impact of the recession on mental health and the impact of welfare benefit reforms on mental health and employment. Study 1 reflects on the methodological challenges of investigating natural policy experiments such as those outlined in this thesis. Study 2 investigates the impact of initial rises in unemployment during the recession on suicides, Study 3 investigates trends in self-reported mental health problems during and after the recession when welfare reforms were introduced. Study 4 investigates the mental health effects of a specific policy introduced from 2010 to use a new tougher assessment to reassess the eligibility of disability benefit claimants. Study 5 presents a systematic review of international evidence investigating the employment effects of changes to the eligibility and adequacy of out-of-work disability benefits. Study 6 investigates the employment effects of the disability benefit reassessment policy in England.

Results: The onset of the 2008 recession in England and subsequent rise in unemployment was associated with a rise in suicides. The association between increases in unemployment and rises in suicides was stronger in the 2008 recession than it had been in the previous 1990s recession, suggesting that welfare policies may have been less effective at reducing the mental health impact of unemployment. The trend in suicides however continued to increase between 2010 and 2013 even after unemployment peaked and began to decline. The prevalence of reported mental health problems also increased from 2009. Whilst unemployment trends explained some of the initial increase in reported mental health problems, it did not explain the continued increase and widening of inequalities from 2010 to 2013. The policy introduced in 2010 to reassess the eligibility of disability benefit claimants was associated with adverse trends in mental health, including a further rise in suicides, self reported mental health problems and antidepressant prescribing. A systematic review of international evidence indicated that similar policies did not generally increase employment, but rather moved people from disability benefits onto other benefits. The disability benefit reassessment policy introduced in 2010 appears to have moved people with mental health problems from inactivity into unemployment, but there was no evidence that it had improved the employment chances of people out-of-work with mental or physical health problems.

Conclusion: It is likely the 2008 recession had an adverse impact on mental health. This may have been greater than it would otherwise have been because of changes to the welfare system over recent decades. Welfare benefit reforms since the recession have then potentially exacerbated this situation, and may have led to further adverse trends in mental health that particularly affected the most disadvantaged groups. These welfare policies have not led to improved employment chances for people out-of-work with health problems, suggesting that the harms may outweigh any benefits. These policies have been associated with an increase in the numbers of people out-of-work with mental health problems potentially leading to greater reliance on welfare in the future.

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Abbreviations

BHPS	British Household Panel Survey
BNF	British National Formulary
CPP	Canadian Pension Plan
DEMETRIQ	Developing Methodologies to Reduce Inequalities in the
Determinants of Health Inequalities	
DWP	Department for Work and Pensions
ESA	Employment Support Allowance
GDP	Gross Domestic Product
GHQ	General Health Questionnaire
GVA	Gross Value Added
HR	Hazard Ratio
HSCIC	Health and Social Care Information Centre
HSE	Health Survey for England
IB	Incapacity Benefits
IWA	Incapacity to Work Act
JSA	Job Seekers Allowance
NCHOD	National Centre for Health Outcomes Development
NDV	Non-equivalent Dependent Variable
NHS	National Health Service
NIHR	National Institute of Health Research
NUTS	Nomenclature of Territorial Units Statistics
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least Squares
ONS	Office for National Statistics
QLFS	Quarterly Labour Force Survey
QPP	Quebec Pension Plan
WCA	Work Capability Assessment

1 Chapter 1: Introduction.

1.1 Relevance of the issue.

Welfare benefits that provide income to groups of people who do not have sufficient economic security from other sources are a core feature of all modern welfare states. These welfare benefits are potentially important determinants of health and health inequalities. Since the 1970s however there has been a trend in many countries towards welfare state retrenchment, with the introduction of reforms to reduce social expenditure, privatise welfare services and restrict access to and reduce the value of welfare benefits.¹ Economic crises have tended to accelerate this trend. The recessions of the 1980s and 1990s were associated with the first phase of retrenchment and the 2008 economic crisis has hastened plans to reduce the size and role of the welfare state.² Social epidemiological research has increasingly recognised the importance of adequate and universal welfare provision for promoting population health and reducing health inequalities.^{1,3}

The 2008 economic crisis in the UK led to the largest programme of fiscal consolidation of any advanced economy since World War II, and the welfare system has been a specific target of this policy.⁴ Relatively little is known about the consequences of this for public health. Trends in mental health might provide an early indication of the impact of these policies and the groups most affected. Policy-makers argue that these changes to the welfare system are necessary to balance public finances and to promote employment. The health effects are rarely recognised or considered in assessing alternatives. The studies of this thesis aim to identify the impacts of the economic crisis and subsequent welfare benefit policies on mental health and the employment of people with health problems, to inform approaches that mitigate these effects and provide evidence for alternatives.

1.2 Previous research and gaps.

There is a growing body of literature indicating the impact of economic crises and welfare policies on health. The adverse effect of recessions and rises in unemployment on mental health have been demonstrated in numerous studies.^{5–11}

Whilst some studies have indicated that welfare policies can mitigate these effects, these have generally been limited to macro level comparisons between countries.^{9–}

¹² Similarly much of the literature investigating the effect of welfare policies on health has tended to be based on cross-country comparisons.^{13–15} These have generally indicated that more generous social democratic regimes tend to have better population health.^{13–15} There is, however, a lack of evidence about the impact on health and health inequalities of specific welfare benefit policies in high-income countries. Whilst there has been an expansion of research investigating the health effects of cash transfers in low-income countries,^{16–18} there remains limited research into the health effects of the social transfer systems of established welfare states and the consequences of reducing entitlements and access to these schemes. There has been more research investigating the employment effects of welfare benefit policies,¹⁹ however this has largely focused on unemployment benefits and there has been less research investigating the employment effects of the changes to disability benefits that have been the target of recent reforms. This thesis seeks to address these gaps in the evidence base by analysing population datasets to investigate the causes of mental health problems during the recent recession and subsequent period of welfare reform, as well as using systematic review methods and econometric analysis to investigate the mental health and employment effects of recent changes to out-of-work disability benefits.¹

¹ By out-of-work disability benefits I mean income support benefits that are paid to people who are unable to work due to disability i.e Incapacity Benefit and Employment Support Allowance, as opposed to benefits such as Disability Living Allowance and the new Personal Independence Payments which are paid to cover the extra costs of disability.

1.3 Aims and objectives of the research.

The overall aims of the thesis are to:

- Advance understanding of the impact of recession, and welfare benefit policy, on mental health and the employment of people with health problems.
- To highlight the implications for policy of these findings.
- To contribute to methodological advances in evaluating the health impact of natural experiments and synthesizing the evidence from these evaluations.

Within this framework the studies in this thesis have pursued the following 6 objectives.

- To investigate the extent to which the 2008 recession in the UK was associated with an increase in suicides and the contribution of trends in unemployment to this rise.
- To investigate trends in the prevalence of mental health problems and mental health inequalities before, during and after the economic crisis to explore the contribution of economic factors to this and the potential impact of welfare benefit policies.
- To investigate whether the programme to reassess the eligibility of claimants of out-of-work disability benefits was associated with an increase in mental health problems.
- To conduct a systematic review of the evidence that investigates whether variation in the generosity or eligibility requirements of disability benefit programmes affects participation in employment.
- To investigate whether the programme to reassess the eligibility of claimants of out-of-work disability benefits was associated with an increase in the chances that people with longstanding health problems moved into employment.

- To outline key issues involved in evaluating the impact of population-based social policies on health and health inequalities and consider ways to address these difficulties.

1.4 Structure of the thesis.

The thesis consists of an initial chapter that outlines the framework for the research. This is followed by a series of 6 published studies that are presented in chapters 3 to 8. Each study chapter also includes an introductory commentary that explains how the study links to preceding and following chapters and implications for the overall objectives of thesis. Finally the concluding chapter integrates the findings from the published studies. Specifically:

Chapter 2 sets out a framework for the research outlining the economic trends and welfare reforms in England before, during and after the recession and the theoretical and empirical evidence for their potential impact on mental health and employment. This evidence base is used to develop a logic model of the interactions between the recession, welfare reform and mental health. I outline how the 5 empirical studies in this thesis investigate these pathways and the methodological approach used.

Chapter 3 consists of Study 1 in the form of a published book chapter discussing some of the methodological challenges involved in evaluating the impact of complex social policies.

Chapter 4 consists of the published methods, results and conclusions of Study 2 Investigating the early effects of the recession and the initial rise in unemployment on suicides.

Chapter 5 consists of the published methods, results and conclusions of Study 3 investigating the subsequent trends and inequalities in self reported mental health problems and the potential contribution of unemployment, declines in wages and welfare reforms to these trends.

Chapter 6 consists of the published methods, results and conclusions of Study 4 investigating the mental health consequences of the policy to reassess the eligibility of existing claimants of out-of-work disability benefits using a new tougher assessment.

Chapter 7 consists of the published methods, results and conclusions of Study 5 - a systematic review of studies investigating the employment effects of welfare reforms that change eligibility requirements or the level of disability benefits.

Chapter 8 consists of the published methods, results and conclusions of Study 6 investigating the employment consequences of the policy to reassess the eligibility of existing claimants of out-of-work disability benefits using a new tougher assessment.

Chapter 9 presents my discussion and conclusion of the thesis as a whole, pulling together the key findings from the six studies, discussing the strengths and limitations, methodological advances, and implications for policy and future research.

Following these chapters there are the appendices relating to each chapter. For each of the 5 empirical studies (chapters 4-7) these are the appendices that were peer reviewed and published with the main papers.

2 Chapter 2: A Framework for the research.

2.1 Background

Welfare policies can be divided into two main groups “Cash” or “Care”.²⁰ The former includes free or subsidised services such as childcare, health care and social care for older people or people with disabilities. The latter includes welfare benefits covering income loss due to poor health, disability, the provision of unpaid care, unemployment and old age. In this thesis I investigate the impacts of these welfare benefit policies and the economic crisis on mental health and the employment of people with health problems. I focus on welfare benefits paid to people out of work due to unemployment, health problems or disability.²¹ These policies aim to reduce the risk of poverty in these groups and to enable people to return to employment if they are able to. They are also important for helping individuals sustain their health and wellbeing, particularly more disadvantaged groups, who are more likely to rely on these collective resources when faced with unemployment or disability.²⁰ Welfare benefit policies therefore have important implications for public health and health inequalities.

Recessions result in rapid rises in unemployment, and welfare benefits can help reduce the economic and health consequences of this for the people affected. The rise in welfare benefit receipt during recessions can also increase demands for reforms to welfare policies as governments seek to reduce the numbers of claimants. The recent recession and subsequent welfare reforms in the UK can be seen as natural experiments - policies or events that are not under the control of researchers, but where variation in the population’s exposure to these policies or events makes them amenable to research that evaluates their impact.²² In this thesis I use these natural experiments to investigate the relationship between recession, welfare reform and mental health. How did the recession affect mental health? Did welfare benefit policies mitigate this effect? What can we learn from the

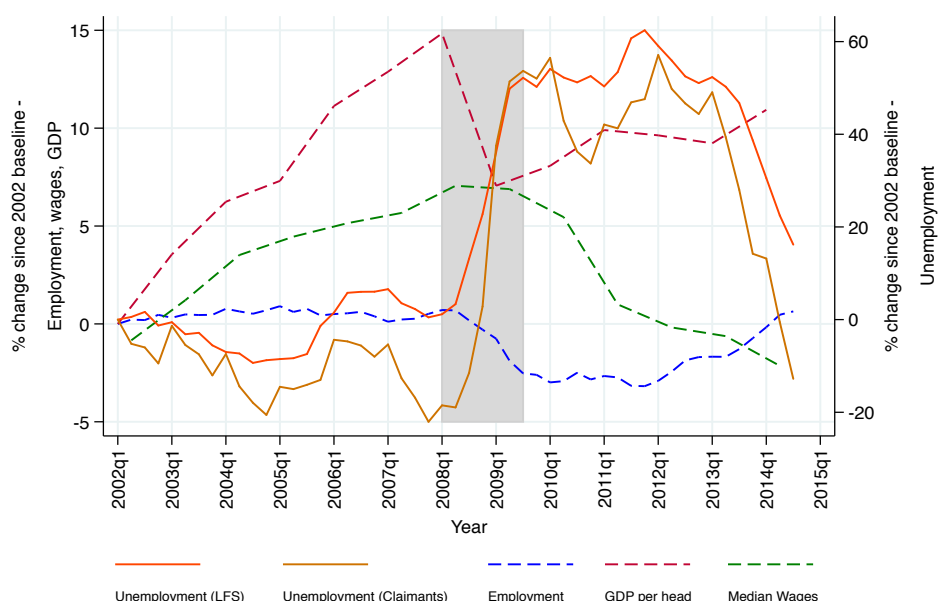
welfare reforms implemented in response to the financial crisis and what impact have they had on mental health, mental health inequalities and the employment of people with health problems?

In this chapter I outline economic trends and welfare benefit policies before, during and after the recession, discuss the evidence for their potential impact on mental health and the gaps in the evidence base. This evidence base is used to develop a logic model of the interactions between the recession, welfare reform, employment and mental health. I outline how the studies in this thesis investigate these pathways and the methodological approach I have used.

2.2 The economic crisis.

The global economic crisis of 2008 was the worst since the Great Depression and the collapse of the financial system was only prevented by national governments bailing out the banks. In the UK GDP dropped further than it had in any recession since the 1930's,²³ however unemployment did not rise and employment did not fall as much as it has done in previous recessions. Wages, however, fell to a much greater extent - the largest continuous fall in real wages on record.²⁴ Partly as a result of cuts in public expenditure the recovery has been the slowest on record.²⁵ Whilst employment began to increase from 2011, GDP per capita only returned to its pre crisis levels in 2015 and median wages are not expected to return to pre-crisis levels until 2017 (see Figure 1). Much of the increase in employment since 2011 has been in more precarious forms of employment.²⁶

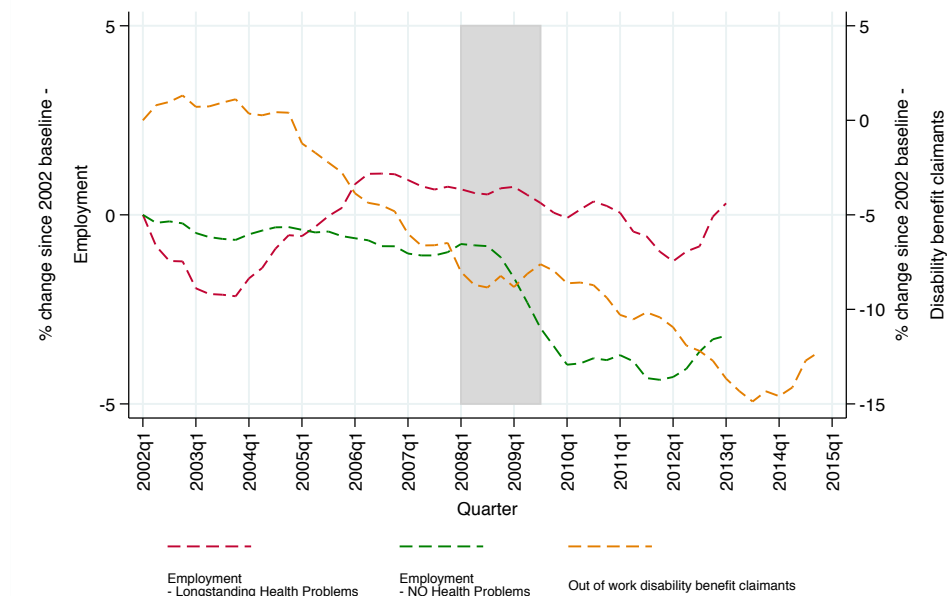
Figure 1. Change in unemployment, employment, GDP and wages since 2002. % change since baseline. Unemployment measured using Labour for survey (LFS) and Claimant rate. Grey area indicates recession. (source: ONS)



Other international studies of the recent and previous recessions have found that people with chronic health problems and disabilities were more likely to lose their jobs in recessions, than people without health problems.^{27,28} This does not seem to have been the case in the UK during the 2008 recession.

Figure 2 shows the relative change in employment for people with and without long standing health problems. The fall in employment associated with the recession was actually more pronounced amongst people without a health problem (see Figure 2). The employment of people with long standing health problems was increasing leading up to the recession, this trend reversed just before the recession and then there was a gradual decline in the employment of people with health problems from that point. (see Figure 2) The number of people receiving out of work disability benefits had been declining since 2003, there was then a slight reversal of this trend during the recession, this was then followed by a continued decline until 2013 when the number began to increase.

Figure 2. Change in the employment of people with and without health problems and change in claimants of out-of-work disability benefits (Incapacity benefits and Employment Support Allowance). % change since 2002. Grey area indicates recession. Employment rates based on 4 quarter moving average (sources: QLFS, DWP)



2.3 The welfare state and welfare reform.

The history of welfare provision.

Welfare can be defined as the resources that enable individuals to fulfill their capabilities.²⁰ This includes individual resources generated within families and through the labour market as well as collective resources such as those raised through taxation. The system whereby the state undertakes to use these collective resources to promote economic and social goals has become known as ‘the welfare state’.

The welfare state developed in the late nineteenth and early twentieth centuries. In the UK during the 19th century fairly limited ‘poor relief’ was provided through the Poor Law and workhouse system.²⁹ By the end of World War I, old-age pensions, school meals, and the first social insurance scheme had been introduced in the UK and in Germany compulsory education, old age pensions and the world’s first health

insurance program had been introduced.³⁰ Following the great depression and the Second World War there was a period of major welfare state expansion, and earlier more selective forms of welfare were supplanted by more universal and comprehensive welfare provision.²⁹ Different models of welfare provision however developed in different countries. Esping-Andersen (1990) has defined three types of welfare regimes – liberal, conservative and social democrat. These are based on the relative role of the state, markets and households in the welfare system and the level of decommodification - the degree to which individuals, or families, can uphold a socially acceptable standard of living independently of market participation”³¹ In this typology the UK is seen as a liberal regime with a minimal level of decommodification and a central role for individuals and market relationships.

The 1942 Beveridge Report is seen as the foundation of the modern welfare state in the UK. As well as proposing the establishment of a National Health Service it proposed a comprehensive National Insurance Scheme. This scheme was largely enacted through the National Insurance Act of 1946 and it led to working-age people paying weekly contributions to the state from their earnings, in return for benefits when unemployed, sick, widowed, or retired.³² This left only a residual role for the main means-tested benefit called National Assistance. The contributory principle was central to this initial conception of welfare benefits, "benefit in return for contributions, rather than free allowances from the State."³³ However from the late 1940s this principle has increasingly been eroded. Initially during the late 1940s and 1950s, the contribution period for retirement pensions was shortened.³⁴ As the value of national insurance benefits fell and the proportion of nonearning households grew in the 1950's and 1960's increasing numbers of people relied on National Assistance. National Assistance was then replaced by various means-tested benefits in the 1970's and 1980's targeted at working age households including supplementary benefit and income support. Overall expenditure of welfare

benefits has increased rapidly since the 1946 National Insurance Act from around 4% of GDP in 1948 to 14% in 2009.³⁵ Most of the increase in expenditure on working age welfare benefits has been driven by increases in means tested non-contributory benefits.⁵

Welfare Reform.

The mainstream political consensus in support of the welfare state ended with the economic crises of the 1970s and 1980s. Poor economic performance and increasing expenditure on social provision undermined the budgetary foundations of the welfare state. With the election of Margaret Thatcher in the UK and Ronald Reagan in the US, the welfare state was presented by government as “not simply a victim of poor economic performance but one of its principal causes.”³⁶ High taxation and regulation were seen as reducing incentives for capital investment and welfare benefits and strong unions as reducing incentives for work. This period initiated a series of ongoing reforms that have sought to reduce the size of the welfare state, reduce the level of welfare benefit payments, increase the privatization of welfare services, and to shift the emphasis from the entitlements of welfare recipients to their responsibilities.

By the late 1990's a broad consensus had developed across political parties in the UK concerning the need for these welfare reforms. Whilst the recent economic crisis has intensified the implementation of these reforms, the broad changes can be seen as a continuation of a process of reform that started in the 1980's.

The justification for welfare reforms over this time has focused on three arguments. Firstly there is the affordability argument that the level of expenditure on welfare benefits cannot be sustained. As noted above expenditure on welfare benefits has increased rapidly over the long term, as have other areas of public expenditure, and

UK Governments have not been able to raise sufficient taxation on a sustained basis to match this rising public expenditure. This is partly because economic globalisation has reduced the capacity for governments to extract corporation taxes.³⁷ With an aging population, pensions and health care expenditure are inevitably increasing and the higher levels of public support for these areas of expenditure has led policy maker to focus on trying to reduce expenditure on working age benefits.³⁴

Secondly there is the widely held concern that welfare benefits act as disincentives for employment. This is based on the standard economic textbook model of labour supply, whereby individuals choose to work on the basis of an income/leisure trade-off. The provision of welfare benefits shifts these incentives reducing labour supply.³⁸ This is seen as particularly important, as getting more people into work, is seen by governments as the solution to a number of social problems. Since the 1980's UK governments have emphasized how work is the most effective route out of poverty.³⁹ Also increasingly the non-wage benefits of work are being emphasized by policy makers, including improved health, increased self-esteem and reduce social exclusion.³⁹ Conversely not working is now seen by government as one of "the most destructive forces in our society."³⁹

Thirdly policy makers often argue that the receipt of welfare benefits has a direct adverse effect on the attitude and behaviours of claimants.³⁹ Lawrence Mead, who provided the main theoretical basis for the 1990s welfare reforms in the US, criticized previous welfare programs for providing benefits to recipients without setting requirements for how they should behave in return.⁴⁰ According to Mead, it is because of this, that welfare recipients have become dysfunctional, leading to the collapse of poor communities and an increase social disorder.⁴⁰ Mead proposed that welfare policy should be used to "enforce values" and "set the norms for the public functioning of citizens". In particular he argued that active welfare

programmes should require recipients to work as a condition of support.⁴⁰ His approach led to the US workfare programmes in the 1990s have has been increasingly influential in the UK⁴¹

Welfare reforms however, are not simply implemented to achieve expressed social and economic goals.⁴² They are also political strategies that aim to achieve political goals.⁴² They are implemented in part to signal to the public the stance that the government is taking on welfare provision. Public support for welfare spending on the poor has consistently declined over the past three decades.⁴³ It is unclear the extent to which this has driven public policy or been the result of public policy. It is likely there is a cyclical relationship, with public policy influencing media coverage and the public's beliefs about benefit claimants, and politicians developing policy based on their perception of public opinion.⁴⁴ The increased emphasis on the responsibilities of welfare recipients during the 1997-2010 Labour government could be seen as a move to distance itself from its label as the "welfare party". It has been argued that a similar approach was followed by the Democrat Party in the US to create a public opinion environment more favorable to anti-poverty efforts.⁴² The motivation behind recent policies to tighten benefit eligibility criteria and reduce benefit levels, could therefore primarily be about, signaling 'toughness' on welfare to the wider electorate, rather than any expectation that the policy will lead to improved social and economic goals. It could also be argued that recent welfare reforms and the long term trend to increase means testing and reduce the contributory aspects of welfare benefits are part of a political strategy to present welfare as a program for the "underserving poor".⁴⁵ The purpose could be to shift the public's perception of welfare, so that it is no longer seen as a system of rights and entitlements and rather is seen as a system of hand-outs to those who do not contribute to society. This then helps drive popular support for programmes that reduce access to benefits, making welfare retrenchment more politically acceptable.

2.4 Out-of-work welfare benefit policies before, during and after the 2008 recession.

Before the crisis

Reforms to out-of-work benefits over the past 2 decades have tended to reduce adequacy and increased conditionality. By adequacy I mean the level of benefit paid to recipients. Welfare benefits in the UK are lower than in most other European countries and are generally well below levels the public think are needed to achieve a socially acceptable living standard.^{46,47} The term generosity is used, rather than adequacy, in much of the literature when referring to changes in levels of payment, however given the low baseline levels of benefit payments in the UK, I prefer to use the term adequacy. By conditionality I mean the requirement that claimants engage in particular patterns of behaviours, such as job search, training or work placements or risk losing some or part of their entitlements.^{48,49}

From the mid 1980's claimants of unemployment benefits were required to attend job centres for regular interviews and were no longer allowed to refuse a job on the grounds of suitability.⁵⁰ The introduction of jobseeker's allowance (JSA) in 1996, further increased conditionality, requiring claimants to demonstrate they were actively seeking work or risk losing their benefits.⁵⁰ Alongside the changes in conditionality, there has been a reduction in the contributory component of unemployment benefits and an increase in means testing.⁵⁰ Overall the adequacy of unemployment benefits has declined. At the beginning of the 1980s unemployment benefits replaced around 24% of the average worker's wages, by 2005 this had reduced to 16%.²¹ Changes in eligibility have also reduced the proportion of unemployed people claiming unemployment benefits from around 93% in 1985 to 61% in 2013.⁵¹

Out of work disability benefits have been the focus of a number of reforms over the past 2 decades that have sought to increase the employment of people with disabilities and also reduce pressure on public finances by reducing expenditure on disability benefits. In 1995 the Incapacity for Work Act introduced a new scheme - Incapacity Benefit that replaced Invalidity Benefit. The new benefit was no longer available to people over state pension age, eligibility conditions were also tighter and the adequacy of the benefits was reduced for older workers. The 2008 Welfare Reform Act replaced Incapacity Benefits with Employment Support Allowance (ESA) for new claimants. This included a new more stringent assessment, the Work Capability Assessment. This assessment categorises applicants into three groups; firstly those who are fit for work and not eligible for the benefit; secondly those who are eligible but required to prepare for work or risk losing their benefit (the work related activity group); and thirdly those with the most severe impairments who are not obliged to undertake any work-related activity (the support group). Since the 1980's the adequacy of out of work disability benefits has also gradually declined from around 25% of average wages in 1980 to 15% in 2012.⁵²

During the 1990s, many countries introduced welfare-to-work programmes in an effort to reduce the numbers of people claiming welfare benefits. These programmes provide job search assistance, training, education and/or subsidised work to support people receiving welfare benefits into employment. Increasingly these programmes have become mandatory and one of the conditions of benefit receipt. From 1997 the UK Government introduced a series of welfare-to-work programme for the people receiving unemployment and out-of-work disability benefits. This included the 'New Deal' programmes targeted at young unemployed people, older unemployed people, the long-term unemployed, lone parents and people with disabilities. A new programme called Pathways to Work was introduced

nationally in 2005 and was mandatory for new claimants of out-of-work disability benefits.^{53,54}

During and after the crisis.

In 2009, in response to the rise in youth unemployment during the recession, the Labour government, introduced the Young Person's Guarantee. This included a package of support for long term unemployed people aged between 18 and 24 including a £700 million programme of subsidised jobs called the Future Jobs Fund. Engagement in this programme was compulsory for young people who had been receiving JSA for more than 10 months.

In 2010 the Conservative-led coalition government began implementing policies to reduce the public deficit that had rapidly increased due to the financial support provided to the banks and falling tax revenues.⁵⁵ These "austerity" measures largely focused on cuts in public expenditure, particular spending on welfare benefits and local government^{56,57} and they have generally had a disproportionate impact on more disadvantaged groups.⁵⁷⁻⁶¹

An important component of the government's plan to reduce the welfare bill, was to use the Work Capability Assessment to reassess the eligibility of all 1.5 million people who had started claiming Incapacity Benefits prior to the introduction of Employment Support Allowance. Claimants who were found to be fit-for-work were then taken off disability benefits and those assessed as not able to work transferred onto the new benefit scheme – Employment Support Allowance. The expectation was that a substantial number would be found to be fit for work and moved off the benefit case loads resulting in a net saving £1billion.^{50,62} This process started in October 2010 and was planned to be completed by April 2014. The work was carried out in regional assessment centres by a private French systems integration firm called, Atos, through a contract with the Department for Work and Pensions (DWP). This programme was a major operation, at its peak in May 2011, 11,000

people were undergoing reassessment each week. Due to a number of logistical problems there was considerable regional variation and delays in the rate at which reassessments were processed.^{63–66} The reassessment rate began to decline in 2013 and eventually Atos quit the contract following campaigns from disability rights groups and the government failed to meet its target to complete the process by April 2014.

The 2012 Welfare Reform Act further introduced changes to reduce the adequacy of benefits paid to working age claimants. This included limiting the non-means tested portion of ESA, effectively reducing the amount paid to people who have other sources of household income or significant savings.⁵⁴ A benefit cap was introduced limiting the total amount of benefits a family can receive. An under occupancy charge was introduced, that reduced the amount of rent that is covered by housing benefit for tenants with a spare room – known as the bedroom tax.⁶⁷ From 2011 the uprating of most out-of-work benefits including ESA and IB was changed from the Retail Price Index to the Consumer Price Index gradually reducing the real terms amount people receive in benefits.⁶² Whilst there were not major changes to the structure of unemployment benefits between 2010 and 2013, the severity and number of the sanctions applied to those that failed to comply with conditions increased substantially.^{48,49}

In 2011 the government introduced a new welfare-to-work initiative called the Work Programme that replaced all the previous schemes targeted at the unemployed (e.g. the New Deals) and people with disabilities (e.g. Pathways to Work).^{53,54} The main difference between the Work Programme and the previous initiatives is that it is provided by private contractors through a payment-by-results framework. Contractors are free to design programmes as they see fit, but the payments they receive depend on the number of clients that enter employment.⁶⁸ This scheme is

increasingly involving mandatory unpaid work placements, sometimes referred to as 'workfare'.⁶⁹

2.5 The mental health impact of welfare benefit policies

Defining mental health.

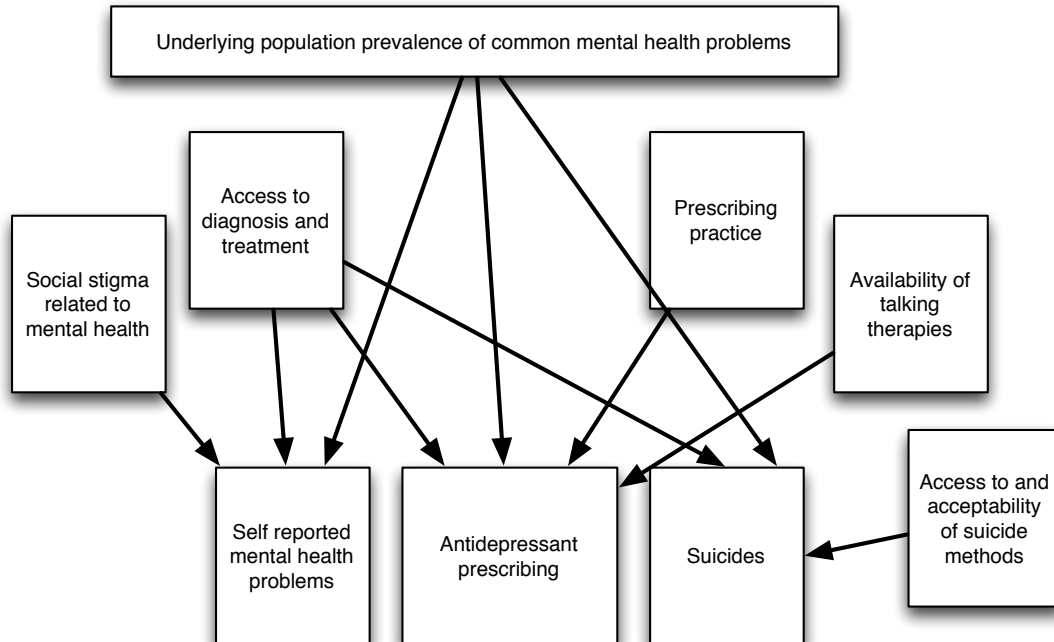
To investigate the mental health impact of welfare policies it is first necessary to clarify what I mean by mental health. Definitions of mental health and mental illness are highly contested. Mental health is variously defined in terms of subjective wellbeing, as the absence of mental illness or as a capacity to adapt and self-manage in the face of social, physical, and emotional challenges.⁷⁰ The concept and taxonomy of mental illness, is even more disputed than that of mental health.⁷¹ Debates have focused on which combination of symptoms, social functioning, and aetiology should be included in definitions of mental illness, and whether there are naturally occurring discontinuities.^{72,73} Many authors have recognised the role of social and cultural processes in the production of diagnostic taxonomies and that diagnostic categories are "outcomes of historical development, cultural influence and political negotiation"⁷⁴ Increasingly it is recognised that many mental health problems exist on a continuum in the population rather than as discrete categories and that mental health and mental illness are not necessarily two ends of the same continuum.⁷⁵

The evidence indicating a link between economic adversity and mental health is strongest for common mental health problems such as depression and anxiety.⁷⁶ Whilst there is some evidence linking psychotic conditions to inner-city deprivation, there is less relating psychosis to relatively short term changes in economic circumstances.⁷⁷ Whilst people living in poverty tend to report lower levels of wellbeing, measures of positive mental health tend to be relatively stable over time and may not be sensitive to short term changes in economic

circumstances.⁷⁸ In this thesis, therefore, I focus on common mental health problems defined as a set of emotional, cognitive and behavioural symptoms generally characterised by the dimensions of depression and anxiety.⁷⁹ In the 2007 Psychiatric Morbidity Survey It was estimated that around 7.5% of the population experience these symptoms at a level of severity that is likely to require treatment.⁷⁹

It is likely that changes in the three measures used in this thesis – self reported mental health problems (see Chapter 5 for definition), antidepressant prescribing rates and suicides will directly relate to changes in the distribution of common mental health problems in the population. Changes in these measures, will however, also be affected by other factors. It is likely that changes in self reported mental health problems are influenced by changes in access to healthcare and in people's propensity to disclose mental health problems due to stigma. Similarly changes in the level of antidepressant prescribing will also be affected by changes in access to diagnosis and treatment, prescribing practice and the availability of alternative treatments such as talking therapies. Suicide is closely related to the prevalence of common mental problems with around 90% of individuals who take their own lives having a common mental disorder.⁸⁰ Other important factors, however, will also influence changes in the suicide rate. Improvements in access to diagnosis and treatment of common mental health conditions are likely to reduce suicide risk⁸¹ and trends in the availability of suicide methods are known to have had a large effect on suicide trends.^{82,83} Therefore as Figure 3 below shows, it is likely that changes in the three measures of mental health problems used in this thesis, reflect changes in the underlying prevalence of common mental conditions, conditional on trends in access to health care, prescribing practice, access to talking therapies, social stigma and access and acceptability of suicide methods.

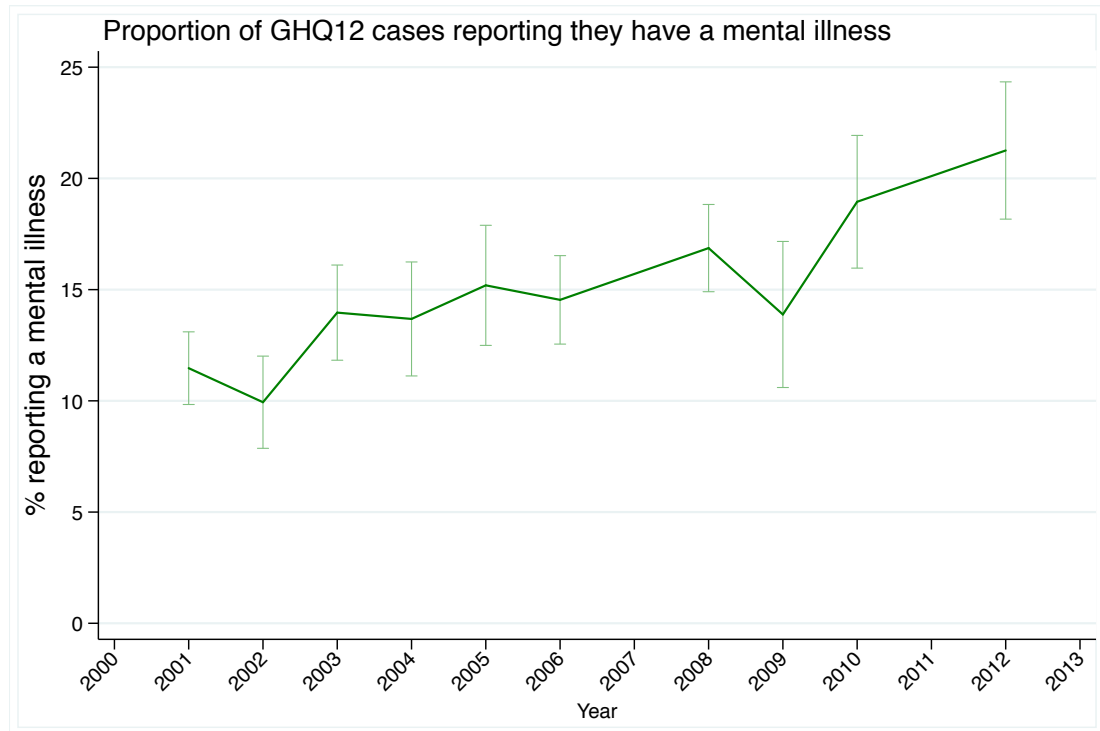
Figure 3. The relationship between underlying population prevalence of common mental health problems, self reported mental health problems, antidepressant prescribing rates, and suicides.



These conditional factors have tended to follow long-term secular trends. The Department for health has funded repeated surveys since 1994 to track trends in attitudes to mental illness.⁸⁴ These show an approximately linear improvement in attitudes towards mental illness since 1997. There is no indication from this survey that the recession was associated with a change in this trend and there are no significant differences in attitude to mental illness by region, suggesting that regional factors such as the prevalence of mental health problems or socioeconomic conditions do not modify the attitudes that people have to mental illness. Similarly there have been long term increases in the proportion of people with a common mental disorder receiving treatment^{79,85} and approximately linear increases in antidepressant prescribing and more recently in access to psychological therapies.^{86–88}

To investigate how the trend in self reported mental health problems relates to the trend in the prevalence of symptoms of common mental health problems in the population, I have used data from the Health Survey for England (HSE). This includes a validated screening instrument for Common Mental Disorders – the 12 item General Health Questionnaire (GHQ12) and a question that asks respondents about the health conditions that they have. This latter question is similar to the question used in the studies of this thesis to define self-reported mental health problems in the Labour Force Survey. Respondents with a score of 4 or more on the GHQ12, are defined as a ‘case’ and have a high likelihood of having a Common Mental Disorder such as Depression and/or Anxiety⁸⁹. It is likely that the trend in the proportion of these GHQ cases that also report that they have a mental health condition will broadly reflect trends in the probability that people with symptoms of mental health problems actually report that they have a mental health condition, which as noted above will depend on trends in other factors such as access to diagnosis and changes in people’s propensity to disclose mental health problems (see Figure 4). As we can see from Figure 4 this proportion has increased in an approximately linear fashion during the time period covered by the studies in this thesis. Testing whether this trend varied by area deprivation as measured by the Indices of Multiple Deprivation, also shows that deprivation did not have any modifying effect on this trend ($p=0.7$). It is therefore reasonable to assume that factors influencing whether people experiencing mental health problems actually report they have a mental health problem in household surveys have followed approximately linear trends and that this did not change during the recession. Including time trend terms in the analysis will therefore largely control for these secular trends.

Figure 4. The proportion of respondents in the Health Survey for England who are defined as having a Common Mental Disorder using the GHQ12, who report that they have a mental illness 2001-2012.



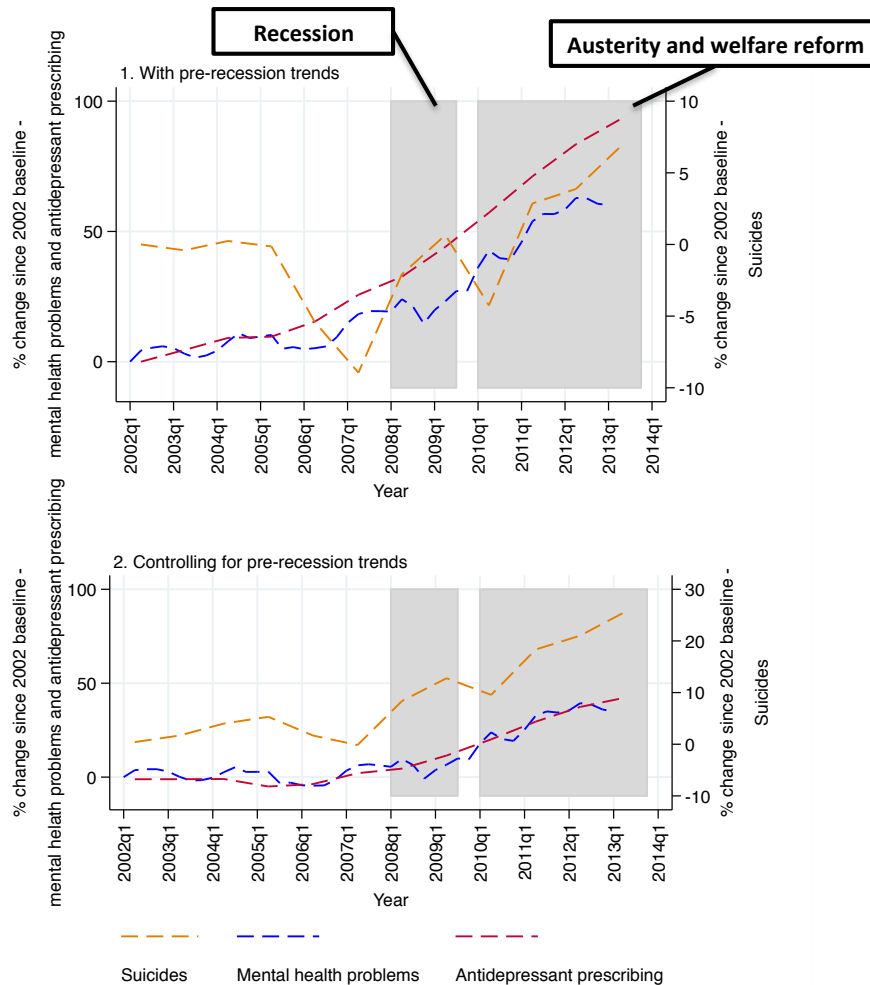
Trends in mental health.

During the recession and the period during which austerity measures and associated welfare reforms have been implemented a number of indicators of population mental health have deteriorated. Figure 5 shows the trend before, during and after the recession, in the three mental health measures used on this thesis, suicides, self reported mental health problems (see Chapter 5 for definition) and antidepressant prescribing. This highlights how trends in suicides reversed and trends in mental health problems and antidepressant prescribing accelerated during the recession and have continued to increase through to 2013 even after unemployment started to fall from 2011 (see Figure 5).

The fact that trends in self reported mental health problems and antidepressant prescribing were increasing before the recession probably reflects the long-term

secular trend of increased diagnosis and treatment of common mental health problems. The psychiatric morbidity surveys in 2000 and 2007 provide the most reliable estimates of the population prevalence of common mental health problems in England showing that there was no change in prevalence between these time points.⁷⁹ There has also been a long term declining trend in suicides since the 1930s. This is largely explained by a reduction in access to methods of suicide, and improvements in diagnosis and treatment of common mental health problems.^{82,83} The divergent pre-recession trends in these indicators can therefore be explained by the long-term trends in these other factors. The second panel in Figure 5 shows the trend in these three indicators with the pre-recession trends removed, showing that once we account for pre-existing trends long term trends, the three indicators show a similar change in trend during the recession and subsequent period of austerity and welfare reform.

Figure 5. Trends in the suicide rate in the working age population (18-64), the prevalence of mental health problems and antidepressant prescribing before, during and after the 2008 recession. Panel 2 indicates trends after adjusting for the pre-recession trend in each indicator – i.e indicating the divergence from the pre-recession trend. (sources: ONS, Quarterly Labour Force Survey and Health and Social Care Information Centre.)



The social and psychological determinants of mental health problems.

Psychological models of common mental health problems focus on the role that cognitive, behavioral and psychodynamic processes play in generating mental health problems.^{90–92} Perhaps the most influential of these has been that proposed by Beck (1967) who identified three dominant cognitive patterns that give rise to depression, often referred to as the negative cognitive triad; negative view of self,

negative view of the world, negative view of the future.⁹⁰ These psychological models of common mental health problems have however been criticised for paying to little attention to the actual difficulties people face in their everyday lives.⁹³ Whilst psychological models have frequently identified the experience of powerlessness and hopelessness as important precursors of common mental health problems^{94,95} they have rarely related the perception of powerlessness to the structural processes that generate power differentials in society. A notable exception to this is the classic study investigating the social origins of depression conducted by Brown and Harris in 1978.⁷³ They present data indicating how provoking events and vulnerability factors contribute to the onset of depression in women.⁷³ Importantly, they related the distribution of these factors to social class. Events that involved loss, or threat of loss and chronic stress were capable of provoking onset up to a year later. They further identified 4 vulnerability factors that modified the relationship between provoking agents and onset - the quality of relationships with a partner or other confidants, loss of a mother before age 11, caring for three or more children under 14, and lack of employment. The distribution of both provoking events and vulnerability factors were associated with social class and these explained the entire class difference in risk of depression in women.

Since the 1980's there has been increasing international focus on health equity and action on the social determinants of health, from the Black report in 1980 to the 2010 review of health inequalities in England by Michael Marmot.⁹⁶ As well as leading to developments in the empirical evidence base, conceptual models have been developed to explore how socioeconomic factors influence health.⁹⁷

In particular this has led to the development of psychosocial models of health inequalities that emphasize how perception and experience of personal status and social relationship in unequal societies lead to stress and poor health. At the level of the individual, inequality forces people to compare their status, and resources with

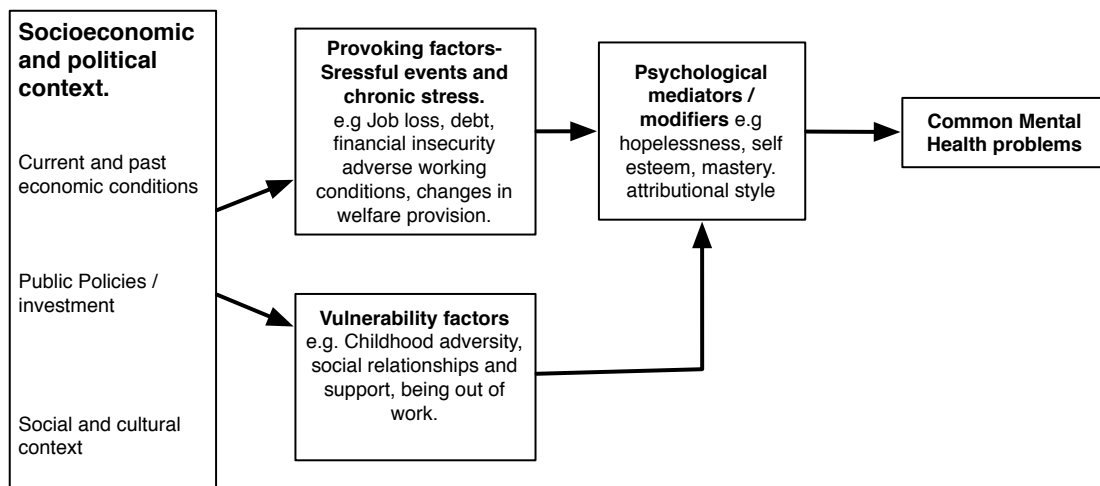
those of others, leading to feelings of shame and worthlessness provoking chronic stress that undermines health.⁹⁷ At the level of society as whole inequalities weaken social capital – reducing group membership, social trust and social cohesion leading to poorer health through psychological and biological mechanisms.⁹⁸ These approaches have been called neo-Durkheimian as they have their origins in Durkheim's work on Suicide.⁹⁹ He argued that the growth in suicide in 19th-century France was a product of the rise of individualism, the erosion of intermediary ties between individuals and declines in social integration.⁹⁹ There are parallels here with Brown and Harris's work that indicated that the quality of social relationships modifies the relationship between stressful events and onset of depression.

These psychosocial approaches have been criticized by those who argue that to understand the links between social inequality and health we must begin with the structural causes of inequalities, and not just the perceptions of that inequality.⁹⁷ These materialist approaches emphasise how structural inequalities lead to inequalities in resources, power and the material conditions in which people live. For example inequalities in education, health services, transportation, working conditions, environmental controls, availability of food, and quality of housing. This leads to the differential accumulation of exposures and experiences that adversely effect health.⁹⁷

Clearly the psychosocial and materialist perspectives are not mutually exclusive, and at least in the case of mental health problems the adverse effects of material conditions must be mediated and modified through psychological processes. Figure 6 shows the conceptual model used in this thesis, adapted from Brown and Harris, indicating how the social and political context, including economic trends and public policy decisions influence the distribution of both vulnerability and provoking factors likely to lead to mental health problems. Psychological processes mediate the

relationship between mental health and both vulnerability and provoking factors. These influence the extent to which an individual exposed to risk factors will experience a mental health problem. Within social epidemiology and psychology, researchers have increasingly recognized the importance of timing in understanding causal links between exposures and outcomes across the life course.⁷³ In this model some vulnerability factors may result from conditions earlier in a persons life course, for example childhood adversity or be related to the accumulation of risk across the life course^{76,95}

Figure 6. A conceptual model of the social determinants of common mental health problems - adapted from Brown and Harris (1978).



There are therefore a number of pathways through which welfare benefit policies might impact on mental health, by influencing provoking factors and/or vulnerability. Firstly they could prevent the negative consequences of job loss – by preventing financial insecurity, secondly by promoting employment and social inclusion they may reduce vulnerability and thirdly the direct effects of the welfare benefit receipt process itself could be a provoking factor or influence vulnerability to mental health problems. The following sections outline evidence related to these pathways.

The mental health effects of recession and unemployment and the preventative role of welfare policy.

Recessions lead to a rise in unemployment. The work of Finlay-Jones and Brown,¹⁰⁰ later confirmed by others,⁷⁶ has indicated that events whose meaning involved “loss” (including loss of a job or income) are particularly associated with the onset of depression. Exposure to circumstances that are seen as being outside an individual’s control are also thought to be particularly likely to precipitate common mental health problems.^{94,95} Other theories have emphasised how maintaining a sense of self is a key factor that influences vulnerability to depression,^{71,73,101} and that loss of routine potentially disrupts circadian rhythms precipitating mental health problems.¹⁰² These theories indicate that the loss of income, control over circumstances, self-esteem, and routines that unemployment precipitates are likely to increase risk of mental health problems and these mechanisms have largely been demonstrated empirically.^{103,104} Several systematic reviews have also indicated a negative longitudinal association between unemployment and mental health^{12,103,105–108} and numerous ecological studies of countries, or regions within countries, have found that increases in unemployment lead to rises in male suicides, particularly during recessions.^{5–11}

Welfare benefit policies therefore may mitigate this link between unemployment and mental health problems by minimizing the extent to which being out of work leads to a loss of income, lack of control over circumstances, reduced self-esteem, and disrupted routines. A number of international comparative studies have indicated that the negative impact of recession and unemployment on mental health is reduced in countries with stronger social protection systems and two studies in the US found that unemployment compensation ameliorated the effects of unemployment on depression.^{9–12} It could be argued that income from welfare benefits may not have the same health benefits as earned income, however recent

reviews of the evidence indicate that increases in income tend to have beneficial mental health impacts on low income households regardless of whether this was from work or from welfare benefits.^{109,110} Although it is likely that reducing the adequacy of or restricting entitlements to benefits could adversely affect mental health, there are relatively few empirical studies that investigate this.¹¹¹ One exception is a study from Canada that found that a policy that resulted in a large reduction in welfare payments was associated with an increase in mental health related visits to general practitioners.¹¹¹

Welfare reforms that involve claimants in structured return to work support could have a beneficial impact on mental health by providing greater routine and enabling claimants to remain socially engaged.¹⁰² Research has shown that some return-to-work programmes can mitigate the health effects of unemployment, particularly those that involve training and increased social contact and support. However there is also evidence that some return to work programmes can be more harmful than unemployment on its own.^{112–114}

Unemployment is not the only mechanism through which recessions may have an impact on mental health.¹¹⁵ Recessions also have an impact on people who remain in work. As noted above the 2008 recession in the UK was also associated with an increase in more precarious forms of employment, in particular an increase in part time working, underemployment and self employment. There was also a considerable fall in wages from 2009. Whilst there is evidence that loss of income leads to a deterioration in mental health,^{109,110} there is little evidence to indicate whether part time working, underemployment or self employment are likely to increase risk of mental health problems. There is also evidence that the threat or anticipation of job loss, can have a negative impact on mental health amongst people in work, and rising unemployment may increase work demands and stress, that adversely affects the mental health of people who remain in employment.^{115,116}

Welfare benefits could also mitigate some of these effects by reducing the consequences of job loss and therefore the stress related to anticipating job loss. Since the late 1990's there has also been a large increase in the availability of in-work benefits in the UK. Expenditure on these benefits increased rapidly during this period as wages fell and people reduced working hours. These in-work benefits therefore mitigated some of the potential adverse effects of loss of wages and underemployment amongst people in work.¹¹⁷

Recessions also have financial effects that are not related to either employment or unemployment. Stock market crashes, reductions in access to credit and bankruptcy will effect the income of people with investments and businesses, that could adversely effect their mental health.¹¹⁵ The relationship between recession, debt, associated house repossessions and mental health has been under investigated. The recent economic crisis was caused by rising household debt, particularly mortgages to low income families, that led to a rise in house repossessions prior to the recession.¹¹⁸ It has been suggested that this may have led to an increase in suicides in some age groups, in England during the recent recession, that slightly preceded the rises in unemployment.¹¹⁸

The health benefits of employment and the employment effects of welfare reform.

If employment is good for health then welfare policies that promote employment are likely to have health benefits. Returning to work has generally been found to improve mental health, reduce risk of psychiatric morbidity, and improve health outcomes for sick and disabled people.¹¹⁹ However the beneficial health effects of work depend on its nature and quality. Various work characteristics have been associated with adverse mental health, including, job insecurity¹²⁰, shift work¹²¹, threat of a major organizational change¹²², low control and high demand^{123,124} and

temporary contracts.¹²⁵ Therefore If welfare reforms move people into good quality employment, they are likely to have a beneficial impact on mental health, but the effect could be negative if they move people into precarious work. Some studies from the US have reported beneficial effects of welfare reforms on subjective wellbeing that were largely mediated through increases in employment.¹²⁶ Others, however, have reported mixed or negative effects from these US reforms.^{114,127}

But what is the evidence that recent welfare reforms in the UK are likely to improve employment particularly for people with health problems. Much of the economics literature has investigated how welfare benefits act as disincentives for work, and this evidence is used to justify policies that reduce the adequacy and availability of welfare benefits. These policies are seen as “making work pay” and that by making welfare benefits less attractive than work, they will lead to more people entering employment.¹²⁸ Several studies have found that increasing the levels of unemployment benefits extends the average length of time that people remain unemployed^{129,130}, however there is less evidence indicating whether reducing the adequacy of unemployment benefits increases employment. There is evidence from a systematic review that time limiting unemployment benefits increases the chance that long term unemployed people enter employment,¹³¹ although this is not a policy that has been implemented in the UK. This review, however, found that the included studies did not investigate the quality of the jobs that people took up as a result of this policy.

Disability benefits have been the main focus of recent welfare reforms in the UK. The government believes that policies to reduce adequacy, restrict eligibility and increase conditionality of disability benefits will increase the employment prospects of claimants by removing disincentives for work.¹³² Several studies in the US have concluded that increased availability of disability benefits led to a large decline in the labour force participation of older men over the past few decades.^{133–135} Many of

these studies have however been criticised for exaggerating the disincentive effects of disability benefits.^{136–138} There are fewer studies from Europe investigating this issue and it may not be sensible to generalise from the US context to countries such as the UK with more extensive welfare systems.

A systematic review of welfare-to-work programmes targeted at the unemployed found that they improved participant employment chances by a small amount, but that the evidence did not suggest that this effect differed by type of programme.¹³⁹ Evaluations of previous welfare-to-work programmes for people with disabilities in the UK, have generally indicated that they had some positive impact on the employment prospects of participants, although these effects were small.⁵³ These and similar approaches in other countries have tended to be less effective for more disadvantaged groups.^{53,140–145} A common theme in many studies is that the achievement of positive outcomes depended on high levels of trust between advisors and clients⁵³, with some indication that public providers performed better than the voluntary or private sector.¹⁴⁶ Systematic reviews of quantitative and qualitative studies have tended to show that multi-component disability management programmes that bring together clinicians, employees, employers and welfare services are generally effective.^{147–149} Those studies that have assessed effectiveness for specific health conditions have mainly focused on musculo-skeletal conditions, less is known about the effectiveness of return to work programmes for people with mental health problems.¹⁴⁹

The current welfare to work scheme in the UK - “The Work Programme” has been criticized for failing to effectively support people with disabilities into employment. Because providers are paid when people return to work, it is claimed that they target clients who are closest to the labour market whilst providing minimal support for those that are seen as the least likely to move into employment – often people with health problems and disabilities.^{150,151}

The mental health effects of the welfare benefit assessment and receipt process.

There is very little evidence indicating the direct mental health effects of the welfare benefit assessment and receipt process. Psychological theories would suggest that welfare policies that reduce the control that people have over their lives are likely to have an adverse impact on their mental health.^{94,95} The increase in compulsion and conditionality associated with recent welfare reforms has tended to erode the autonomy of claimants with the threat of benefits being withdrawn dependant on bureaucratic decisions that are often seen as distant and outside their control. Assessment processes, such as the Work Capability assessment have been criticised for being unfair and disempowering,¹⁴⁷ and there are numerous anecdotal reports that they have led to a deterioration mental health.^{148–151}

The level of stigma associated with claiming welfare benefits is also likely to have an impact on the mental health of claimants. Self esteem is thought to influence risk of mental health problems^{71,73,96} and stigma limits people's capacity to maintain a positive sense of self.¹⁵² Recent welfare reforms, in particular the increased use of conditionality, are potentially increasing the stigmatization of welfare recipients.⁶⁹ Recent reforms have been associated with a large rise in negative representations of welfare recipients in the media that could have adverse consequences for their mental health.¹⁵³

Vulnerability to the mental health effects of welfare reform.

It is likely that some groups will be more sensitive to the mental health effects of welfare policies than others. As outlined above it is the combination of proximal events and pre-existing vulnerabilities that precipitate common mental health problems. Childhood adversity is known to increase risk of adult mental health problems.^{90,76} One characteristic of the UK is that it has lower levels of social mobility than most other wealthy countries¹⁵⁴, and patterns of poverty that are

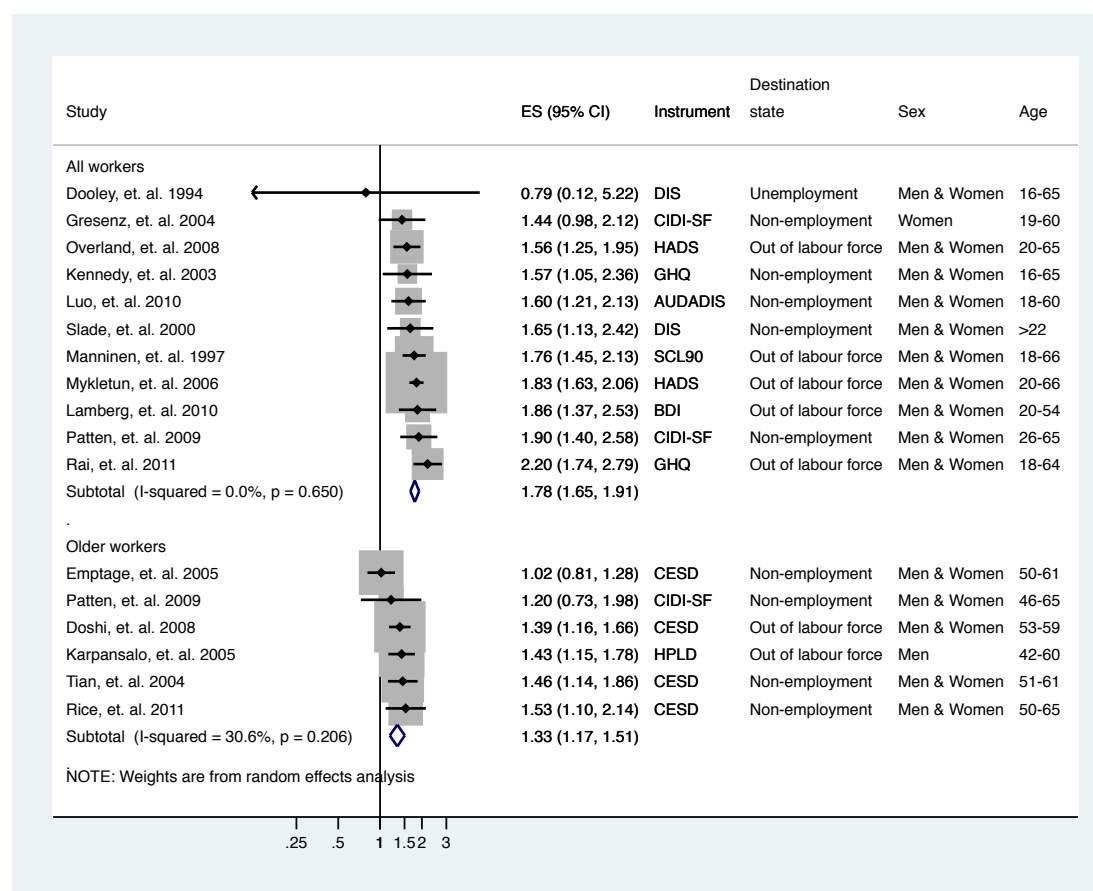
clustered in particular parts of the country that have a long history of disadvantage.¹⁵⁵ This means that people of working age from more disadvantaged groups are more likely to have experienced adversity in childhood, than more affluent groups. They are therefore likely to be particularly vulnerable to the adverse mental health effects of welfare reform. They are also more likely to be living in areas with weak labour markets and face fewer and more precarious employment opportunities when benefits are withdrawn.

2.6 The employment impact of mental health problems.

The mental health consequences of welfare reform are clearly important from a public health perspective, however, if mental ill-health is a major barrier to employment, the impact of welfare reform on mental health, will also have consequences for employment policy. There are relatively few studies investigating the extent to which mental health problems result in people leaving employment or prevent people from entering employment. As background to this thesis I conducted a systematic review of all longitudinal studies investigating the effect of the presence of common mental health problems on loss of employment or return to work (see Appendix 2.1 for an outline of methods).

The review identified 24 studies that assessed the effect of common mental health problems on transitions *out of* employment.^{156–179} The studies indicated that common mental health problems tended to increase the chances that people left employment although the effect was lower in older workers. Seventeen of the 24 studies reported comparable measures and were included in a meta-analysis. The pooled relative risk that working age people with mental health problems left employment compared to those without mental health problems was 1.78 (95%CI 1.6 to 1.9), whilst in those studies that just investigated the effect amongst older people the relative risk was 1.3 (95%CI: 1.2 to 1.5) (see Figure 7).

Figure 7. Meta-analysis and pooled estimate of the relative risk that people with common mental health problems leave employment as compared to those without common mental health problems. (Ben Barr's own analysis)



The review also identified 12 studies that investigated the effect of common mental health problems on people's chance of *entering* employment.^{167,180–189} Seven of these studies reported that mental health problems were significantly associated with a reduction in re-employment.^{167,180,183–187} The others did not detect a significant effect. These studies were very heterogeneous, in terms of the effect measures reported and the groups of non-employed people they included and it was not possible to combine the results in a meta-analysis.

Therefore welfare policies that promote mental health are more likely to achieve the overall objective of enabling more claimants to enter and stay in employment (which in turn may have additional health benefits). Conversely if policies adversely affect

mental health this could lead to claimants experiencing even greater barriers to employment.

2.7 Gaps in the evidence.

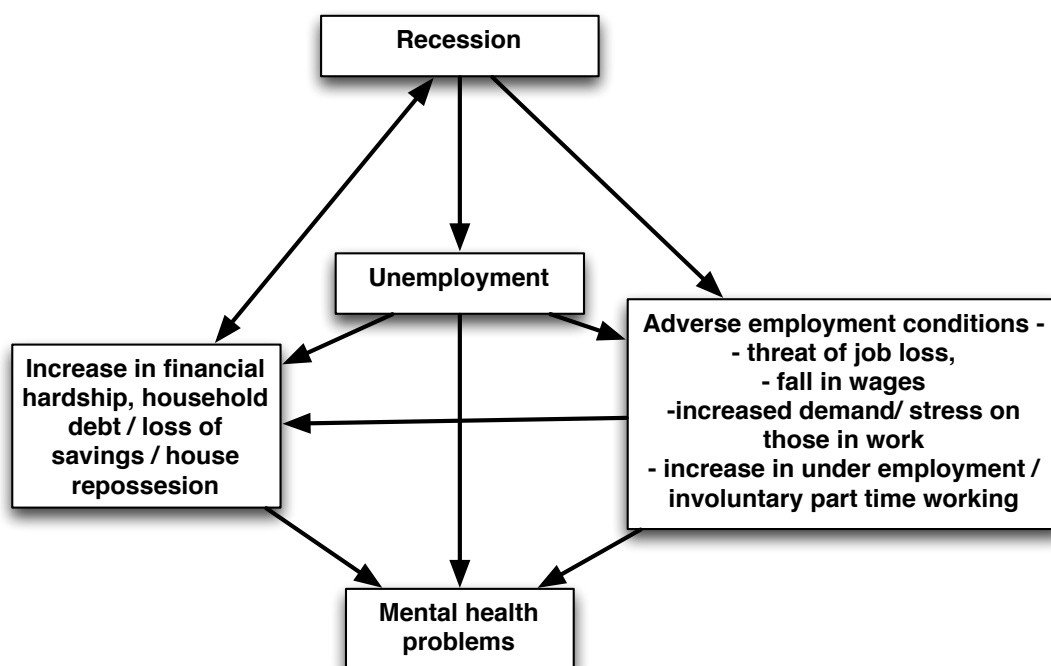
In summary, there are plausible mechanisms through which welfare benefit policies could have both positive and negative impacts on mental health. There is some evidence that the effect of unemployment on mental health is reduced in countries with more generous welfare benefits and also evidence that higher levels of benefits may prolong unemployment. There are, however, several important gaps in the evidence base, that this thesis aims to address.

- There are studies that demonstrate the effect of increases in unemployment and recession on mental health and that welfare benefits policies mitigate these effects. There is, however, limited evidence of this association in the UK during the recent recession and the extent to which current welfare benefit policies mitigate these effects.
- Evidence for the employment effects of policies that reduce eligibility and access to disability benefits has largely focused on the US and there has been no review or synthesis of the evidence for countries with more developed welfare systems.
- There are very few studies that investigate the mental health effects of specific policies that reduce access to or the adequacy of welfare benefits, and no studies specifically related to disability benefits.
- There is very little if any empirical evidence that investigate the mental health effects of the welfare benefit assessment and receipt process, in particular the assessment process and the increasing number of conditions that recipients need to comply with or risk losing their benefits.

2.8 A logic model.

From the evidence reviewed above, I have developed a logic model of the pathways through which the onset of the 2008 recession and subsequent welfare reforms were potentially linked to population mental health. Firstly I have outlined the pathways through which recession is likely to have an impact on mental health (see **Figure 8**). As mentioned above recessions can lead to mental health problems directly through rises in unemployment, however, it is also possible that they lead to a rise in adverse employment conditions that are detrimental to health. They could also lead to direct financial losses and both cause and be caused by rises in debt, which increase risk of mental health problems. These three factors are closely interrelated, rises in unemployment in an area may directly affect employment conditions in that area, both rises in unemployment and a decline in employment conditions may lead to increased financial hardship and debt and increased risk of house repossession. It is likely that local trends in these factors will therefore be closely related, i.e those areas that are most affected by increases in unemployment will also be the areas most affected by increases in financial hardship and a decline in employment conditions, although these may occur at different time points. This may mean that it is not possible to distinguish between these factors and that indicators such as local unemployment rates capture the effects of wider adverse economic trends.

Figure 8 Logic model 1. Possible economic mechanisms linking recession to mental health problems.

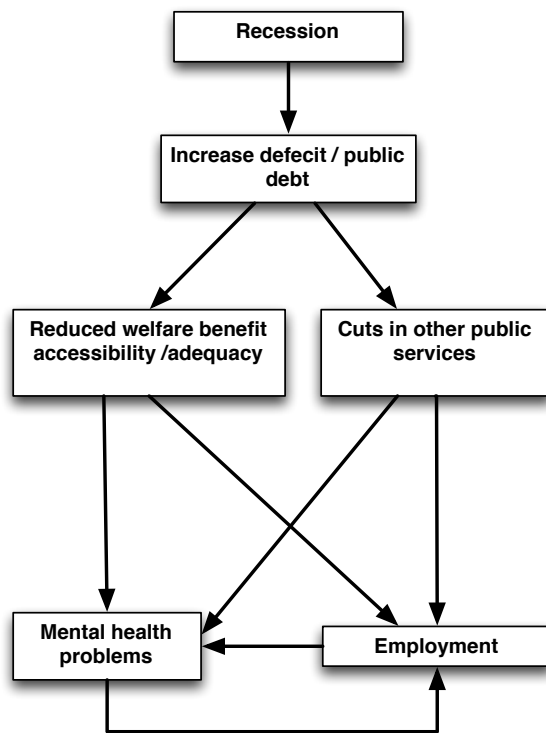


Secondly I have outlined the pathways through which welfare reform and cuts in public services may influence population mental health (see **Figure 9**). As noted above the current welfare reforms are a continuation of policies started in the 1980s and 1990s. The process of reform, however, intensified following the 2008 recession in part to tackle the deficit that had been caused by the financial, crisis. These have been implemented alongside other ‘austerity’ measures designed to cut public expenditure. It is possible that by removing disincentives for work, these welfare reforms could increase employment amongst groups with disabilities and health problems, which in turn could have health benefits if they moved into high quality employment. However, as I have outlined in the literature review above, there are potential adverse mental health effects from these reforms. The introduction of a

more stringent assessment processes, might have had a negative impact on mental health, because of the stressful and stigmatising nature of the procedure itself, the loss of benefits from claimants assessed as fit-for-work, or because the policy moved vulnerable people into precarious work that was detrimental to their health.

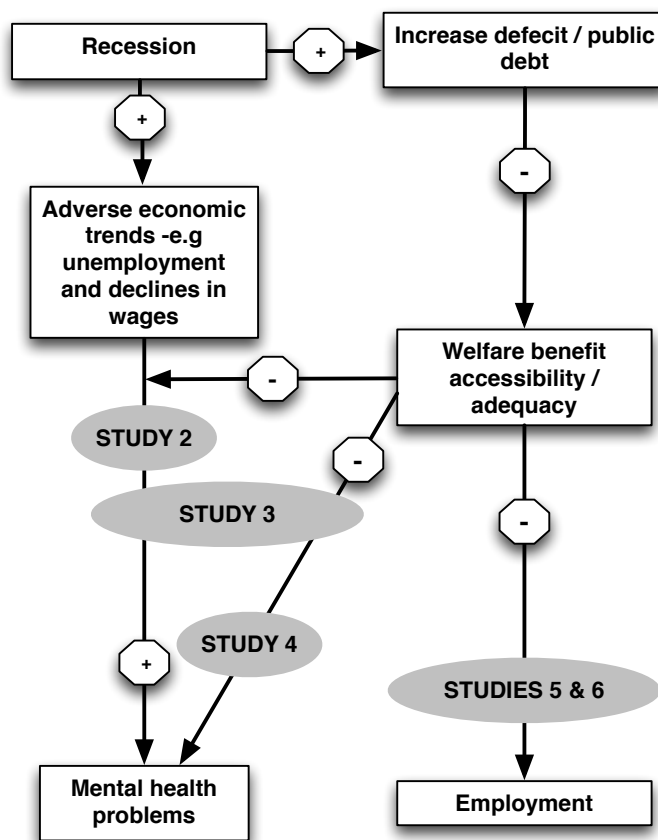
Recent welfare reforms have been implemented as part of a package of austerity measures that have also resulted in cuts to a number of other public services. The largest cuts have been in local government⁶⁰ resulting in the loss of social care, leisure and environmental services that could have an impact on mental health. Although health spending was protected to a certain extent during this time, there were some cuts in mental health services which could have had an adverse impact on health.¹⁹⁰ These cuts in public services could have a direct effect on mental health through the loss of services. They could also have an indirect effect on mental health by resulting in job losses and a deterioration in working conditions both in the public sector and in employers contracted to the public sector. (see **Figure 9**). Any increases in mental health problems resulting from welfare reforms or cuts to public services will probably have reduced the employment chances of the people affected.

Figure 9 Logic model 2. Pathways through which welfare reform and austerity measures may have an impact on mental health.



The final logic model shows the pathways investigated in this thesis. Firstly the direct effect of the recession through economic trends on mental health problems and the extent to which these were mitigated through welfare benefit policies at the time and secondly the effect of welfare reforms on mental health and the employment of people with mental health problems.

Figure 10. Final Logic model indicating the interaction between the 2008 recession, subsequent welfare reforms, mental health problems and employment.



Study 1 discusses some of the challenges involved in evaluating the impact of complex social policies. Each of the 5 empirical studies that follow then investigates different components of this logic model. Study 2 demonstrates the early effects of the recession and the association between initial rises in unemployment and increases in suicides. Study 3 investigates the trends in mental health problems and the contribution of rises in unemployment and falls in wage to these trends. Study 4 investigates the impact on mental health of one specific welfare reform – the reassessment of all existing claimants of out-of-work disability benefits using the Work Capability Assessment. Study 4 presents a systematic review of studies investigating the employment effects of welfare reforms that change eligibility requirements or the level of disability benefits (the reassessment policy). Study 6

investigates the employment effects of the reassessment policy. The studies have all been published as follows:

Study 1. Barr, B, K Smith, and C Bambra. “for the good of the cause: generating evidence to inform social policies that reduce health inequalities.” In *Health Inequalities: Critical Perspectives*, edited by K Smith, C Bambra, and S Hill. Oxford: Oxford University Press, 2015.

Study 2. Barr, B., D. Taylor-Robinson, A. Scott-Samuel, M. McKee, and D. Stuckler. “Suicides associated with the 2008-10 economic recession in England: time trend analysis.” *BMJ* 345, no. aug13 2 (August 13, 2012): e5142–e5142. doi:10.1136/bmj.e5142.

Study 3. Barr B, Kinderman P, and Whitehead M. “Trends in Mental Health Inequalities in England during a Period of Recession, Austerity and Welfare Reform 2004 to 2013.” *Social Science & Medicine* 147 (2015): 324–31. doi:10.1016/j.socscimed.2015.11.009.

Study 4. Barr, B., D. Taylor-Robinson, D. Stuckler, R. Loopstra, A. Reeves, and M. Whitehead. “‘First, Do No Harm’: Are Disability Assessments Associated with Adverse Trends in Mental Health? A Longitudinal Ecological Study.” *Journal of Epidemiology and Community Health*, 2015, jech – 2015–206209. doi:10.1136/jech-2015-206209.

Study 5. Barr, B, S Clayton, M. Whitehead, K. Thielen, B. Burstrom, L. Nylen, and E. Dahl. “To what extent have relaxed eligibility requirements and increased generosity of disability benefits acted as disincentives for employment? A systematic review of evidence from countries with well-developed welfare systems.” *Journal of Epidemiology & Community Health* 64, no. 12 (2010): 1106–14. doi:10.1136/jech.2010.111401.

Study 6. Barr, B., D. Taylor-Robinson, D. Stuckler, R. Loopstra, A. Reeves, S. Wickham, and M. Whitehead. "Fit-for-Work or Fit-for-Unemployment? Does the Reassessment of Disability Benefit Claimants Using a Tougher Work Capability Assessment Help People into Work?" *Journal of Epidemiology and Community Health*, 2015, jech – 2015–206333. doi:10.1136/jech-2015-206333.

2.9 The design of studies and methodological approach.

This section sets out the outcomes and data sources used in the studies, followed by broad overview of the approach used on the analysis and measures taken to enhance the validity of findings. The detailed methods for each of the studies are then presented in the published studies in the chapters 3-8.

Outcomes

The studies in this thesis investigate the impact of recession and welfare policies on three mental health outcomes - suicides, self-reported mental health problems and antidepressant prescribing. Suicide mortality data were obtained from the Office for National Statistics (ONS) and based on the standard ONS definition of suicides as deaths over the age of 15 from Intentional self-harm (X60-X84), Injury/poisoning of undetermined intent (Y10-Y342) and sequelae of intentional self-harm / event of undetermined intent (Y87.0 / Y87.23).¹⁹¹

Self reported mental health problems were defined using data from the Quarterly Labour Force Survey (QLFS).¹⁹² In the QLFS respondents are initially asked if have any health problems or disabilities that they expect will last for more than a year, they are then asked to indicate from a list of health problems which ones they have. Respondents were defined as having a mental health problem if they reported they had any of the following: depression, bad nerves, anxiety, mental illness, phobias, panics or other nervous disorders (see Appendix 4.1). Clearly this is not a

validated screening tool for the symptoms of common mental health problems, and simply reflects whether people self-identify as having these problems and were willing to report this in a survey. The only regular and frequent cross-sectional survey representative of the English population that does include a validated assessment of common mental health problems is the Health Survey for England (HSE). This includes the 12 item General Health Questionnaire (GHQ).¹⁹³ The HSE however did not have a sufficient sample size to enable the analysis within small areas (e.g local authorities) that was necessary for the studies on this thesis. The GHQ has also not been included in all years of the HSE and the latest year available was 2012. There is also evidence that the GHQ under reports mental health problems in more disadvantaged groups, limiting its usefulness for investigating inequalities.¹⁹⁴ As I have shown in section 2.5 the proportion of GHQ cases in the HSE who also report that they have a mental health condition has gradually increased over time potentially indicating increases in diagnosis and the propensity for people to report mental health problems in surveys.

Data on antidepressant prescribing were used in Study 3 and Study 4. Antidepressant-prescribing rates per 100,000 population were calculated using data on the number of items prescribed from the British National Formulary (BNF) chapter 4.3 (antidepressants) by each GP practice obtained from the Health and Social Care Information Centre (HSCIC).¹⁹⁵ A prescription item refers to a single item prescribed on a prescription form, generally a course of medicine and is routinely used to measure trends in prescribing.¹⁹⁶ Each GP practice was mapped to the local authority in which the majority of its patients resided using look-up tables provided by HSCIC. The data were then aggregated to the local authority level giving the number of items prescribed per 100,000 registered population.

These indicators were chosen because they were available with sufficient precision, and consistency over a number of years, to enable estimates for relatively small

areas – such as local authority populations. Other measures available at this level would include data on hospital admissions for mental health problems and data from GP practice registers for depression and other mental health problems.¹⁹⁷ Data on hospital admissions and prevalence of mental health problems in GP practices, however, was not available consistently over a long enough time period to be used in the analysis. Data on hospital admissions would also not reflect trends in the more common mental health problems, such as depression and anxiety that were likely to be affected by recession and welfare policies.

As outlined above in section 2.5 whilst there are limitations with these outcome measures, they are likely to broadly reflect trends in common mental health problems at the population level conditional on preexisting secular trends.

Exposures and covariates.

The studies in this thesis include various measures relating to economic trends and policy exposure. Economic measures included the unemployment benefit claimant rate using data from the Department for Work and Pensions, wages from the Annual Survey of Hours and Earnings and Gross Value Added (GVA)² from national accounts, all available through the Office for National Statistics.¹⁹⁸ The main policy exposure variable used in Studies 4 and 6 was the cumulative proportion of the population in each local authority area who had received any outcome from a Work Capability Assessment as part of the reassessment process, by the end of each quarter, expressed as a rate per 100,000 population obtained from the Department for Work and Pensions.

Analysis.

Studies 2,3,4 all involve analysis of longitudinal datasets of aggregate indicators for local areas over time. For studies 3 and 4 the units of analysis were the 149 upper

² GVA is equal to GDP excluding the effect of taxes and subsidies which are applied nationally and is therefore available at the subnational level.

tier local authorities in England. In Study 2, groups of local authorities were aggregated together into 93 areas, based on the Nomenclature of Territorial Units Statistics (NUTS) level 3 groupings developed by EUROSTAT.^{198,199} For Study 6 aggregate data at the local authority level were linked to individual data from the QLFS, allowing a multilevel analysis.

The studies included in this thesis take advantage of the fact that the recession and welfare benefit policies affected different parts of the country to different extents. Using this variation in exposure, the studies used longitudinal methods to analyse the associations between economic and policy trends within local areas and local trends in outcomes. Study 2 uses linear regression to investigate the association between change in unemployment and change in suicide rates. Study 3 uses linear regression to investigate the association between trends in unemployment and wages and trends in self-reported mental health problems, as well as including a descriptive analysis of trends in mental health inequalities. Study 4 uses linear regression to investigate the association between trends in the programme reassessing the eligibility of disability benefit claimants (the reassessment policy) and trends in mental health outcomes. Study 6 used a discrete time hazards model²⁰⁰ to investigate association between trends in the reassessment policy and transitions into employment.

As with all observational studies there are challenges in evaluating the causal impact of recession and welfare reforms on health outcomes and the methods used in these studies have sought to overcome some of these challenges. The pioneering epidemiologist Bradford Hill (1965) developed nine criteria that provide a guide to assessing whether associations in observational research are likely to be causal²⁰¹ (see Table 1) and these provide a framework for the analytical approach used in the studies outlined in this thesis.

Table 1. Bradford Hill Criteria.

1. Strength of Association	The size of the risk associated with exposure not explained by confounding.
2. Consistency	The association is consistent when results are replicated in different datasets / populations.
3. Specificity	Is the association specific to expected outcomes.
4. Temporal sequence	Exposure precedes the outcome.
5. Dose response	Increasing levels of exposure increase the risk of the outcome.
6. Experimental Evidence	The outcome is altered when the exposure is manipulated.
7. Plausible Mechanism	There is a plausible mechanism through which exposure could generate the outcome.
8. Coherence	The association is compatible with existing knowledge.
9. Analogy	The finding of analogous associations between similar factors and similar diseases.

The first challenge is identifying the strength of associations that is not explained by confounding factors. Groups more exposed to recession and welfare policies are likely to not be wholly comparable with those less exposed.²⁰² This means that observed differences in outcomes may be due to underlying differences between these groups rather than the recession or the welfare policy itself. In particular, the challenge is to take into account confounding differences that are not observed in the data.

By using longitudinal data it is possible to not only control for observed confounders but also to control for time-invariant unobserved differences between areas, through differencing or using fixed effects.²⁰³ In Study 2 for example I use the relative difference in suicide rates and unemployment rates between consecutive years with NUTS 3 areas, as the outcome and exposure in the analysis. This method helps

avoid biases that would result from the fact that the correlation between the level of suicides in an area and the level of unemployment is potentially confounded by other characteristics of areas that cause both suicides and high unemployment. Similarly in Study 4 fixed effects regressions are used to investigate the association between trends in the reassessment policy within local authority areas, and trends in mental health outcomes. Fixed effects models are estimated using Ordinary Least Squares techniques on transformed data. The data are first 'demeaned' i.e. the value of each variable is subtracted from the average level of the variable for each individual or group. This is computationally identical to including a separate dummy variable for each local area in the regression equation.²⁰³ Because the model is comparing the trend in exposure and outcome *within* local areas, differences that remain constant *between* areas cannot confound the results.

By using three mental health outcomes derived from different datasets, the studies in this thesis were able to test the consistency of findings across these outcomes and datasets, strengthening the validity of the analysis. Similarly to test the specificity of results Study 4 used Nonequivalent Dependent Variables (NDV).²⁰⁴ These are outcomes that should *not* be influenced by a change in the exposure but that could be influenced along with the outcome by unobserved confounding factors. Finding no effect on these outcomes can enhance the validity of observational analysis.²⁰⁴ In Study 3, I use mental health outcomes in people older than 65 as NDVs as these people were not affected by changes to out-of-work disability benefits, but could be affected by other causes of mental health problems that were associated with the policy.

The longitudinal nature of the datasets used also allows for an investigation of the temporal sequence of exposures and outcomes. In each of the studies I investigate whether lagged exposures predict future outcomes and investigate reverse causality by assessing whether lead exposure variables are associated with

contemporaneous outcomes. The continuous nature of the exposure variables used in these studies also enables investigation of the dose-response relationship between exposures and outcomes.

Finally, an important 'Bradford Hill criteria' is that findings from a single study need to be assessed in terms of whether they are 'coherent' with prior evidence. Study 4 therefore presents a systematic review of the evidence for the employment effects of policies that were similar to the reassessment policy. The findings from this study provide a basis for assessing the results from Study 6 which investigated the employment effects of the reassessment policy.

It should be noted that Bradford Hill did not present these criteria as a set of rules to establish causation but rather areas for consideration in assessing causation. There have been various criticisms made about the Bradford Hill Criteria, these have mainly focused on: (1) whether they are sufficient to determine causality and (2) situations where fulfilling a specific criteria does not indicate that a causal relationship is more likely.^{205,206} Rothman and Greenland have pointed out that none of the criteria alone is sufficient to establish causality and that the requirement that exposure must precede effect is the only necessary criterion.²⁰⁷ Rothman and Greenland (1997) and others have provided counter-examples for strong but non-causal relationships.²⁰⁷ Lucas and McMichael (2005) indicate how in some circumstances divergent rather than consistent results in different populations may indicate a causal relationship depending on the distribution of other causal components.²⁰⁵ Hofler (2005) outlines the implications of Bradford Hill criteria for study design, and concludes that for most of the criteria, whether and how they should be applied, depends largely on the assumed underlying causal system that is being investigated.²⁰⁶ This indicates whether consistency, specificity and coherence of results across different populations and studies indicates a causal or non-causal conclusion. This highlights the importance of developing an explicit theoretical

model of the causal pathways involved to inform study design, an issue I return to in Study 1.

However these criteria are only being used here to provide a framework for outlining the aspects of the study designs in this thesis that aimed to enhance validity. The validity of the methods used in each study needs to be judged in the context of the studies themselves. The methods used in each of the studies are outlined in further detail in the methods section of each of the study chapters. Each of these studies in chapters 3 – 8 has an introductory commentary that explains how each study links to preceding and following studies, implications for the overall objectives of the thesis and the specific contributions of the listed authors.

3 Chapter 3: Study 1 - For the good of the cause: Generating evidence to inform social policies that reduce health inequalities.

Study 1 was published as:

Barr, B, K Smith, and C Bambra. "For the Good of the Cause: Generating Evidence to Inform Social Policies That Reduce Health Inequalities." In *Health Inequalities: Critical Perspectives*, edited by K Smith, C Bambra, and S Hill. Oxford: Oxford University Press, 2015.

3.1 Commentary on Study 1.

Economists have developed approaches for evaluating the impact of policies where the variation in exposure to the policy or event is not under the control of the researcher, often referred to as 'Natural Experiments'. Studies 2, 3, 4 and 6 all applied similar techniques to investigate the effects of economic trends and welfare policies. Study 5 involved a review of studies that have applied these methods. These econometric approaches try to overcome a key source of bias in evaluations of natural experiments - that outcomes may be due to underlying differences between those exposed or not exposed to a policy or event (i.e. confounding factors) rather than being caused by the policy or event itself. In this study I discussed some of the key issues involved in evaluating natural experiments.

Econometric techniques indicate the level of association between policy exposure and an outcome under circumstances that increase the likelihood that the association is causal, however, a level of uncertainty about that conclusion remains. Assessing that level of uncertainty is a challenge, it will depend on prior evidence that the association is causal, the role of confounders and other biases and the probability that the association is due to chance.²⁰⁸⁻²¹⁰

Whilst Randomised Controlled Trials overcome many of the concerns with internal validity highlighted above, they often lack external validity as they tend to be based

on selective samples of the population and interventions that are not implemented in 'real life' circumstances. They may also not be feasible or appropriate for evaluating many policies. One of the advantages of 'natural experiments' is that they can offer greater external validity than RCTs as they are based on assessing the impact on whole populations of policies that were not implemented under experimental conditions. The econometric techniques designed to increase the internal validity of evaluations of natural experiments however generally reduce external validity.²¹¹ This is because they often involve using subsets of the total population exposure to construct groups amongst the exposed and unexposed that are likely to be very similar (e.g. groups just above or below the threshold for intervention).

The perspective that I have developed in this study is that it is necessary to place these analytical approaches within the context of prior evidence and a theoretical framework. This highlights the importance of developing methods for systematically reviewing evaluations of natural policy experiments (e.g Study 5) and developing theoretical models that identify plausible mechanisms through which policies are likely to have an impact and applying mixed methods to investigate these mechanisms. Although I have not used qualitative methods in this thesis, these have a crucial role to play in investigating the mechanisms through which social policies have an impact. I highlight some of these issues in the following chapter from a book on Critical Perspectives in Health Inequalities as a basis for further methodological development in this area.

For the good of the cause: Generating evidence to inform social policies that reduce health inequalities.

3.2 Introduction: Using evidence to tackle health inequalities

Health inequalities are defined as avoidable, unjust, and systematic differences in health between groups with different levels of underlying social advantage or disadvantage²¹²). In a growing number of countries, reducing inequalities in health has become a specific policy objective.²¹³ Most of these countries have also made commitments to ensuring policy responses to health inequalities are ‘evidence-based’ (Smith 2013). Yet, the evidence base regarding how, specifically, to achieve reductions in health inequalities remains limited²¹⁴ and most countries have made little progress in reducing health inequalities.²¹⁵

It is widely agreed that social policies working at the population, rather than individual, level have the greatest potential to reduce health inequalities by addressing the social conditions and economic and political systems that contribute to and sustain them.²¹⁶ However, these types of ‘upstream’ policies present the greatest challenges for researchers trying to evaluate health and other impacts. This results in the ‘inverse evidence law’, whereby the availability of evidence tends to vary inversely with the potential impact of the intervention.²¹⁷ This chapter outlines some key issues involved in evaluating the impact of population-based social policies on health inequalities and considers some of the ways in which researchers are working to address these difficulties.

3.3 Beyond ‘hierarchies of evidence’

Health researchers often refer to a ‘hierarchy of evidence’, whereby different study designs are ranked according to their perceived strength in establishing cause and effect. Traditional ‘hierarchies of evidence’ typically position systematic reviews of

randomized controlled trials (RCTs) at the top, followed by RCTs and other experimental methods that can provide evidence about whether a particular intervention works.²¹⁷ However, as RCTs of complex social policies are often difficult to undertake (as we discuss further later in the chapter), it is likely that they will continue to make up a small part of the evidence that informs effective action on health inequalities. Most social policies that have the potential to influence health inequalities are implemented without prior evaluation and are often not amenable to randomization anyway. To rapidly develop the evidence base, researchers need to evaluate the impact of policy alternatives as they happen ('natural experiments'), whether these are established welfare and economic policies or reforms to health, social, and educational systems. For similar reasons, it has been argued that systematic reviews and syntheses of available evidence relating to complex interventions may need to broaden the kinds of evidence they incorporate²¹⁴

However, broadening research methods to include 'natural experiments' and other innovative approaches raises questions about the nature of causality and the validity of research methods in health inequalities research. In this chapter, we briefly discuss experimental and realist perspectives on causality in the evaluation of social policy. We then explore the limitations of RCTs in generating evidence to influence policy, and approaches for evaluating natural policy experiments that reflect these different perspectives on causality. The chapter then moves on to discuss approaches to systematically reviewing and synthesizing evidence for public health policy audiences.

3.4 Experimentation and realism in evaluating the causal impact of social policies

Policymakers often stress that they are particularly interested in knowledge that will help them make predictions about the probable impact of decisions (e.g. to invest in intervention X or Y, or legislate for policy A or B).²¹⁸ The usefulness of evidence

from a policymaker's perspective depends in part on how much it contributes to this aim. Knowledge about cause and effect is essential for predicting the consequences of policy decisions and interventions. Investigating causal relationships is therefore an important component of research that is intended to influence policy. Such research involves two main challenges: (i) ascertaining causal relationships within a specific context (often called internal validity); and (ii) generalizing from that context to a future situation of relevance to policymakers (external validity). The latter is important because, where policymakers are using evidence regarding the impacts of policies/interventions, it is always being applied in a different context from that in which it was generated. Even if the research is based on the same population in the same place, it will inevitably have been conducted at a different point in time from its application.

Both of these challenges are particularly problematic for evaluating complex social policies. These are policies that work at the population, rather than the individual, level and comprise multiple interrelated components embedded within social contexts. How these components interact with each other and the wider context, to result in particular outcomes, will depend on the meanings people ascribe to situations and how they react to them. This presents problems both for determining the causal relationships between components of a policy and for defining how the components themselves are conceptualized.

Empirical science going back to the eighteenth-century philosopher David Hume has conceptualized 'cause' and 'effect' as discrete measurable events, such as 'taking a treatment' and 'becoming disease free' in medicine. Causal relationships in this tradition are assessed by investigating the association between these 'events' under specific experimental or quasi-experimental circumstances.²⁰⁴ The definition of cause and effect in this experimental approach is based on the counterfactual model. An effect is defined as the difference between what did happen and what

would have happened to those same people at that same time if the cause were not present.²⁰⁴ Clearly it is not possible to observe the counterfactual, so the 'central task of cause probing research is to create reasonable approximations for this physically impossible counterfactual'²⁰⁴ (p. 5.) It is this approach to causality that underpins the experimental method in health sciences.

An influential criticism of this 'sequentialist' model of causation derives from critical realism.²¹⁹ This alternative 'realist' conception of causality posits that to infer that X causes Y, it is necessary to understand the causal mechanism that connects X and Y and the contextual factors on which that connection relies.²²⁰ With respect to social policy, this realist approach recognizes that the mechanisms at work depend on the communicative interactions between social actors, their shared meanings and interpretation of situations. These will not be observable in any empirical sense and can only be investigated through interpretative approaches such as ethnographic study or other qualitative methods.

These two conceptions of causality are not mutually exclusive. Scientists working in the experimental paradigm have often also highlighted a concern with 'mechanisms'. As Shadish et al (2001, p. 9) recognize, whilst 'the strength in experimentation is in describing the consequences of deliberately varying a treatment, ... experiments do less well at clarifying the mechanisms through which, and the conditions under which that causal relationships holds'. The pioneering epidemiologist Bradford Hill (1965) developed nine criteria that could provide a guide to assessing whether associations in observational research are likely to be causal.²⁰¹ An important one of these criteria is to determine a plausible mechanism that may explain observed associations.

The problem for research from an experimental tradition has been how to investigate mechanisms, particularly when these are social in nature. The insights from critical realism indicate that it is essential to use interpretative methods to fully

understand the causal mechanisms that are an intrinsic part of social policy. For example, in-depth case studies including interviews and documentary analysis were used to evaluate the impact of Health Action Zones (HAZ), multi-agency partnerships developed to address health inequalities in England. This showed how the existence of HAZs in a particular area contributed to the development of planning systems that delivered improved services for disadvantaged groups.²²¹

Realist approaches also recognize that, when investigating the effect of ‘a policy’ on specific ‘outcomes’, neither the policy itself nor the outcomes tend to be characterized as discrete, measurable events. The way the policy, outcomes, and any mediating concepts are defined (whether these are decisions, rules, institutions, economic activities, or diseases) will always be abstractions and, as such, dependent on the researcher’s perspective. This will influence the research findings. As Sayer (1999, p. 19) writes, ‘much rests on the nature of our abstractions—that is our conceptions of a particular one-sided component of a concrete object, if they divide that which is in practice indivisible, or if they conflate what are different and separable components, then problems are likely to result’.

This realist critique has given rise to a number of theory-based methods of policy evaluation and evidence synthesis.^{220,222} The key aspects of these approaches include an exploration of the concepts, components, and outcomes of the policy, how they causally relate to each other, and the use of diverse research methods to develop a theoretical map with empirical findings. These approaches have been used in the evaluation of a number of policies relevant to health inequalities, including housing policy,²²³ health care reform²²⁴ and criminal justice policy.²²⁵

3.5 Natural experiments

Many new complex social policies that are likely to have an impact on health inequalities are introduced without any evaluation of this impact. This is partly because such policies may be primarily concerned with the social determinants of

health (e.g. education, employment, housing, etc.) rather than explicitly aiming to improve health. For example (and as argued in Chapter 12), austerity measures may well have an impact on health inequalities, but have been implemented for economic/political reasons without evaluation and without consideration of the health impacts. As pointed out by Petticrew (2007, p. 411), '[t]he public are frequently "enrolled" in real-life policy "experiments" without giving their explicit consent, or indeed without any real prospect of anyone learning anything substantial about the effects of those interventions'. There are relatively few RCTs of complex social policies and fewer still that assess differential effects of these policies by socioeconomic groups,²¹⁴ although the number is increasing^{226,227}

There are a number of reasons for this lack of RCTs. First, there are practical reasons: complex social policies may be universally applied across a country or jurisdiction, limiting opportunities for a control group; the political process of identifying intervention areas may prevent opportunities for randomization; and RCTs may be seen as too expensive. Second: in some cases RCTs are not the most appropriate research method; effects of the policy may be so dispersed they cannot be restricted to specific intervention units (individuals or clusters); the timeframe within which effects occur may be too long and diffuse to be adequately captured in an RCT; and it may not be possible or desirable to standardize interventions in different settings.²²⁸ Third, complex social policies are often determined by politics, ideologies, and principles and are not so much discrete interventions as policy packages. Fourth, there may be good ethical reasons for not undertaking an RCT. If, for example, there is strong, empirically informed theoretical evidence (or evidence from observational studies) which indicates that the impact of an intervention is positive, and does not cause harm, then it may not be considered ethical to provide the intervention for some people and not others.

These objections do not of course preclude the use of RCTs for evaluating complex social policies. Oakley (1998) points out that there has been a long history in the use of RCTs for complex social policies, starting with the income maintenance experiments in the USA²²⁹ However, it is becoming increasingly clear that there are limitations, to the extent that evidence from RCTs can inform action on health inequalities.

Given these limitations, researchers are turning to the investigation of 'natural experiments' to address the gaps in the evidence base²⁰² The term 'natural experiment' is used to refer to policies that are not under the control of researchers, but where variation in the population's exposure to these policies makes them amenable to research that evaluates their impact (Craig et al 2010). Various methods have been developed, particularly in economics, to estimate the impact of these 'natural experiments'. These methods generally apply the conception of causality derived from experimental sciences in non-experimental situations.

The methods used depend on how exposure to the policy varies across a population and over time, and the data that are available. There are three common scenarios. First, there is variation in policy exposure between groups and over time, for example when a policy is introduced within one area (e.g. state, province, pilot sites) and information on outcomes is available over time in this area and comparison areas that have not been exposed to the policy. An example of this is the evaluation of the New Deal for communities, a regeneration initiative in the UK.²³⁰ This used longitudinal survey data to compare outcomes in intervention areas with comparison areas (selected from neighbourhoods in the same local authority with similar deprivation levels but where the New Deal had not been introduced). Compared to these control areas, the intervention was not associated with any improvement in outcomes.²³⁰

In the second scenario, only cross-sectional information is available on differences in exposure to the policy and outcomes in areas with and without the intervention. This approach was used in the study by Belsky et al (2006) assessing the initial impact of Sure Start, an early years intervention in the UK. They used a cross-sectional survey to compare family functioning, parenting, and child-health indicators in programme areas with those areas waiting to become programme areas. The intervention was associated with some positive benefits, but these were mainly amongst relatively less socially deprived children²³¹

In the third scenario, information on exposure to a policy and outcomes is available over time for the same population, before and after the policy is implemented, and there is no unexposed comparison group. So analysis investigates the change in outcomes experienced by the population exposed. This is referred to as an 'interrupted times series design'.²⁰⁴ For example, Herttua and colleagues (2009) investigated the effect of a sudden reduction in the price of alcohol in Finland following deregulation of import quotas within the European Union. By comparing population data before and after deregulation, they showed that this led to a substantial and rapid increase in alcohol-related mortality in the Finnish population.²³²

A key problem with these studies is that the groups exposed to a policy may not be wholly comparable with those not exposed.²⁰² This means that observed differences in outcomes may be due to underlying differences between the study groups (i.e. confounding factors) rather than being caused by the policy itself, thus reducing the study's 'internal validity' (i.e. the confidence that the policy caused the observed outcomes). Various analytical techniques can be used to try to reduce this source of study error. At the simplest level, standard regression techniques are used to adjust for known differences between the comparison groups, or 'fixed' effects can be

included to control for unknown differences between individuals or groups (see Rabe-Hesketh and Skrondal 2008 for a more detailed explanation).²³³

Other, more complex statistical methods such as propensity score matching, regression discontinuity, and instrumental variable designs can be used to derive comparable groups from those exposed and unexposed to a policy. In propensity score matching, exposed and unexposed individuals or groups are matched on a set of baseline characteristics (e.g. Melhuish et al 2008).²³⁴ Regression discontinuity designs are used to compare how outcomes vary between groups just above or just below the threshold for exposure to a policy. For example, an early years intervention in the USA, Head Start, was implemented in communities whose average income placed them below a specific poverty rate. One study used a regression discontinuity design to compare outcomes in areas just above and just below this poverty threshold, and found that the introduction of Head Start was associated with a large drop in child mortality rates.²³⁵ Instrumental variable techniques involve identifying a variable which has a close relationship with exposure to the policy of interest, but in itself has no relationship with the outcome except through its effect on policy exposure. A number of studies have used the fact that in many countries, due to quirks in educational administration systems, a child's month of birth can affect the length of time they stay in education (e.g. Angrist and Krueger 1990; Braakmann 2011).^{236,237} In these studies, 'month of birth' is an instrumental variable for exposure to education. Braakmann (2011), for example, uses this approach in a study that suggests there were no noticeable health benefits associated with attaining some qualifications before leaving school compared to attaining no qualifications. For a further explanation of these techniques, see Shadish et al (2001) or Angrist and Pischke (2009).^{204,238}

One of the benefits of 'natural experiments' is that they can offer greater 'external validity' than RCTs: in other words, results from these studies can more readily be

applied to other similar communities or contexts.²⁰² This is because they are often based on whole populations rather than selected samples, and they investigate the impact of policies as implemented in 'real life' rather than under experimental circumstances. Whilst the analytical techniques described here improve the internal validity of natural experiments, it is important to recognize that they generally reduce external validity²¹¹ (Angrist and Fernandez-Val 2010). For example, Ludwig and Miller's (2007) study of Head Start only estimates the impact of the intervention for those areas that are close to the poverty threshold used to allocate the intervention (i.e. those areas just above or just below this poverty line). This impact may not be generalizable to areas with very high poverty rates.²³⁵

Given the problems presented by natural experiments in terms of both internal and external validity, public health researchers are increasingly recognizing the need for more nuanced methods that incorporate insights from theory-based approaches to evaluation and reflect a realist conception of causality. A key component of these approaches involves setting out the underlying theory of policy implementation. Logic models are often used to graphically outline hypothesized causal mechanisms linking components of the policy, the wider determinants of health, and health outcomes. Various research methods can then be used to investigate these mechanisms. An example of this approach is the evaluation of the policy in Scotland banning smoking in public places. A 'logic model' was developed to indicate how short-, intermediate-, and long-term concepts and outcomes causally relate to each other. A number of quantitative and qualitative studies were then conducted to investigate each of the pathways to impact within this model²³⁹

A number of international comparative studies have used a similar theory-based approach to categorize countries according to the logic of their policy models and then investigate the association between these typologies and health outcomes. For example, a study by Lundberg et al (2008) characterizes countries based on

whether their family support policy system is primarily focused on supporting dual earner or more traditional households with one male earner.²⁴⁰ They found that an increase in the generosity of family benefits in countries with the dual-earner model was associated with a decline in infant mortality, but in countries with other models it was not.²⁴⁰

The validity of these evaluations of complex social policies can be enhanced via an iterative process of matching patterns in the data with a developing theoretical model of how a policy works. Shadish et al (2001) refer to this process as ‘coherent pattern matching’, and indicate that it can increase validity by reducing the plausibility of alternative explanations: ‘The more complex the pattern that can be successfully predicted the less likely it is that alternative explanations could generate the same pattern so the more likely it is that the treatment has had a real effect’ (Shadish et al 2001, p. 105).

There is substantial potential for these methods to be applied more extensively to investigate the impact of complex social policies on health inequalities, particularly at a time when many governments are implementing untested policies as part of their austerity programmes. Although there have been calls for gaps in the evidence base to be filled by investigating natural experiments, there are still relatively few such studies within health inequalities research.²⁰²

3.6 Systematic reviews and the accumulation of evidence

In light of the difficulties associated with evaluating the impacts of complex social policies, results from single studies can be misleading. Systematic reviews of evidence are increasingly promoted by public health researchers as more reliable tools for amassing evidence for policy audiences.²⁴¹ Systematic review methods are an established method of locating, appraising, and synthesizing empirical evidence to answer a given question. Well-conducted systematic reviews showing a consistent effect over diverse populations can help overcome the lack of external

validity often found in individual RCTs, but they can also exacerbate biases where the sample populations of primary studies are systematically unrepresentative.²⁰⁴

The WHO CSDH recommended systematic reviews as a source of evidence for action on health inequalities.²⁴² However, to date, very few systematic reviews address health inequalities.¹³⁵ There are a number of barriers to the use of systematic reviews to assess the impact of complex social policies on health inequalities. First, traditional systematic review methods have tended to focus on synthesizing evidence from RCTs and do not lend themselves to the synthesis of results from studies using the diverse methods outlined here. Second, there are limited tools available for the assessment of the validity of non-experimental evaluation studies.²⁴³

There have also been criticisms that by looking at average effects across multiple studies, systematic reviews may provide only limited insight into what works in what context, or what aspects of a policy enhance effectiveness, particularly where a policy or intervention does not lend itself to standardization^{204,244}. The challenges to assessing causality in quasi-experimental evaluations can be exacerbated when combining results from multiple studies.²²⁰ To address some of these challenges, ‘theory-based’ approaches to evidence synthesis have been developed along similar lines to those found in evaluation research. Guidance on realist²²⁰ and narrative²²² approaches to systematic reviews outlines a series of steps that use the underlying theory of a policy as the framework for synthesizing evidence. Importantly, these approaches involve synthesizing empirical and interpretative evidence from multiple sources to assess the causal mechanisms of a policy’s impact. This approach has been recommended when synthesizing evidence for action on health inequalities.²⁴²

3.7 Conclusion: The need to expand the methodological toolbox

In most countries, health inequalities have not reduced—even in England, where policies were explicitly designed to reduce them.²¹³ The lack of progress may partly be because there has been insufficient evidence to indicate how complex social policies can be developed to address the fundamental causes of health inequalities, the social and economic conditions in which people live. In this chapter I argue that RCTs will be of limited use to policymakers aiming to address these social determinants of health inequalities. Growing efforts to assess the impact of ‘natural experiments’ on health inequalities, and to synthesize diverse kinds of evidence, seem a more promising route to addressing the many gaps in the current evidence base. Methods originally developed in economics for evaluating the effect of policies implemented in non-experimental circumstances may also provide valuable tools for health inequalities research. Insights from theory-based approaches to evaluation can enhance the internal and external validity of these methods. This requires going beyond the dominant paradigm of causality found in the medical and economic sciences and recognizing that the interpretative investigation of social processes can provide robust causal evidence. The synthesis of econometric and qualitative methods, within a realist framework, has great potential for generating evidence to determine what works, for whom, and in what circumstances for reducing health inequalities. The hope is that these approaches will help future policymakers identify more promising policies, and have greater confidence in the existing evidence.

4 Chapter 4: Study 2 - Suicides associated with the 2008-10 economic recession in England: time trend analysis.

This study was published as:

Barr, B., D. Taylor-Robinson, A. Scott-Samuel, M. McKee, and D. Stuckler. "Suicides Associated with the 2008-10 Economic Recession in England: Time Trend Analysis." *BMJ* 345, no. aug13 2 (August 13, 2012): e5142–e5142. doi:10.1136/bmj.e5142. <http://www.bmj/content/345/bmj.e5142>

4.1 Commentary on Study 2.

Main findings of the study.

This study investigated the impact of the 2008 financial crisis on suicides in England. Whilst previous research has demonstrated that suicides tend to rise with increases in unemployment during recessions, this was the first study to demonstrate this in the UK during the recent recession. The rate of suicides had been declining over the decade prior to the recession and we found that the recession was associated with a reversal of this trend accounting for approximately 1000 more suicides than would have been expected based on historical trends. Using variation in unemployment trends across local areas we estimated that each 10% increase in the number of unemployed men was significantly associated with a 1.4% (95% CI: 0.5 to 2.3%) increase in male suicides. There was no significant association between local trends in unemployment and suicides in women.

Interpretation of the findings.

The estimate of the additional number of suicides 'attributable' to the recession in this study, was based on a relatively simple linear projection of the trend prior to the recession. There are two assumptions that underlie this estimate, firstly that the

declining trend prior to the recession was approximately linear and secondly that this decline would have continued in the absence of the recession. As noted in Chapter 2 Suicide rates had been declining in an approximately linear fashion since the 1930s and this is largely explained by a reduction in access to methods of suicide, and improvements in diagnosis and treatment of common mental health problems.^{82,83} The linearity of the pre-recession trend can be tested by comparing a model with a linear time variable, to a model with dummy variables for time periods.²⁴⁵ A joint Wald test indicates that the linearity assumption for the pre-recession period is not rejected ($p=0.75$). It is also probably reasonable to assume that the reduction in access to methods of suicide, and improvements in diagnosis and treatment of common mental health problems that have been driving declines in suicides over a number of decades would have continued between 2008 and 2010. However if, in the absence of the recession, there would have been a slowing of the rate of decline in suicides anyway, then we may have over estimated the number of additional suicides attributable to the recession.

The association between suicides and rises in unemployment demonstrated in this study, was based on a comparison between the trends in suicides and unemployment across regions of the country. Whilst the fixed effects model used in this analysis is relatively robust to unobserved confounding factors, we cannot say whether the increase in suicides was amongst people who were unemployed. As noted in chapter 2, there are likely to be other local economic trends that deteriorate during recessions that may be correlated with local unemployment rates. These include adverse working conditions and an increase in financial hardship. Clearly we may not be able to distinguish between these effects and local unemployment rates. Local unemployment rates may just be a proxy for wider social and economic impacts of recession within each area. There are however a number of reasons to think that at least part of the association reflects the direct effect of job loss on

mental health. Firstly rises in unemployment occurred earlier than declines in working conditions. Whilst the number of suicides increased in 2008, in line with rises in unemployment, falls in wages didn't start until 2009. Secondly there is good evidence from studies using individual longitudinal data for a direct effect of job loss on suicides.^{12,98,100–103} There is less evidence demonstrating the impact of other financial hardships or changes in working conditions on suicide.

Implications of the study.

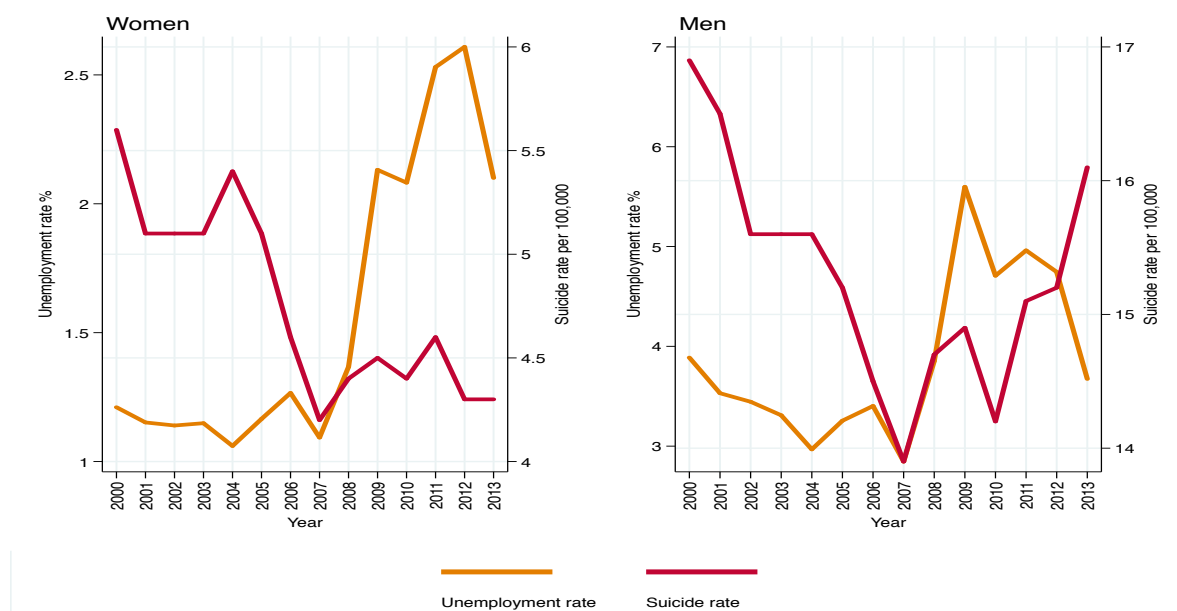
The study has a number of implications for this thesis. Firstly these deaths were not inevitable - increases in unemployment are not associated with increased suicides in countries with better developed social protection systems.¹⁰⁸ The strong association found in this study in England therefore potentially reflects the failure of welfare policies in the UK to sufficiently mitigate the mental health effects of job loss. In additional analysis (see Appendix 3.6) I have replicated the same regression model as conducted in this study, using data covering the 10 year period (1985-1995) which includes the previous 1990-1991 recession. Interestingly this supplementary analysis shows that in this earlier time period the association between increases in unemployment and increases in suicides was much smaller - each 10% increase in the number of unemployed men was only associated with a 0.4% (95% CI: 0.06% to 0.8%) increase in male suicides (test for a difference in effects between the two recessions, $p=0.035$). As I outlined in the introduction, since the 1990s the adequacy of unemployment benefits has reduced considerably relative to wages, there has been an increase in conditionality and eligibility criteria have narrowed. These changes to unemployment benefit policy are one potential reason for the stronger relationship between unemployment and suicides in the 2008 recession as compared to the previous recession.

Secondly, although the UK government could not have prevented the financial crisis and the inevitable rise in unemployment in 2008 and 2009, it is likely that cuts in

public sector funding did further increase unemployment after 2010. Unemployment levels had begun to decline in 2010 and suicides also started to fall again. However following cuts in public funding in 2010 and 2011, unemployment rose again in 2011. Data released since the publication of this paper have shown that suicides also increased again from 2011 after a small decline in 2010.¹⁹¹ (see Figure 11)

Whilst the economic pros and cons of the governments austerity programme can be debated, our research highlights the need for policy-makers to take into account the human cost of policies that are likely to increase job losses.

Figure 11 Trends in the age adjusted rate of suicides and unemployment claimants, England, 2000 to 2010, by sex.



Unemployment levels did eventually recover, falling from the beginning of 2012. From the findings of Study 2 we would have expected the adverse trends in suicides to reverse as unemployment fell. They continued to increase in 2013, however. Study 3 investigates trends in mental health problems between 2004 and 2013 and explores some of the reasons why there was no observed recovery in mental health as the economy recovered.

Author Contributions.

BB collected the data and originated the study. BB, DS and DTR contributed to the analysis and interpretation of the data. All authors contributed to the writing of the manuscript.

Suicides associated with the 2008-2010 recession in the UK: a time-trend analysis

4.2 Abstract

Background: Starting in 2008, suicide rates began to rise in the UK, reversing a long-term decline. However, it is not yet clear whether this increase can be attributed to the recession. A first, essential, step in answering this question is to see whether those areas worst affected by the recession have seen the greatest increases in suicides.

Methods: We calculated the number of excess suicides during the recession (2008-2010) by comparing the actual numbers with what would be expected if previous trends had continued, using time-series analysis. We then quantified the association between unemployment and suicides among men and women in 93 English regions during the years 2000-2010 using multivariate regression models.

Results: Between 2008 and 2010 there were 846 (95% CI: 818 to 877) more suicides among men than would have been expected based on historical trends and 155 (121 to 189) more among women. Historically, short-term yearly fluctuations in unemployment have been associated significantly with annual changes in suicides among men but not among women. We estimated that each 10% increase in the number of unemployed men was significantly associated with a 1.4% (95% CI: 0.5 to 2.3%) increase in male suicides. These findings suggests that about two-fifths of the recent increase in suicides among men (329 suicides, 95% CI: 126 to 532) during the 2008-2010 recession can be attributed to rising unemployment.

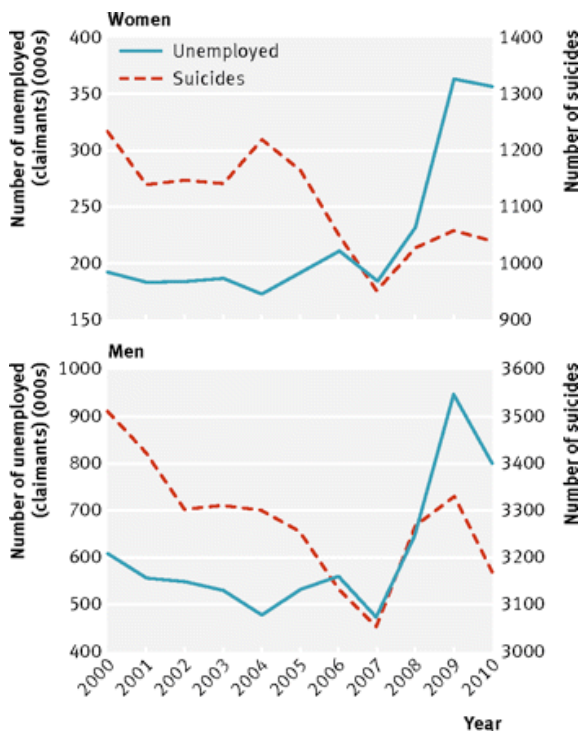
Conclusion: The study is the first to provide specific evidence linking the recent increase in suicides in England and the financial crisis that began in 2008. English regions with the largest increases in unemployment have experienced the largest increases in suicides, particularly among men.

4.3 Background

Few would contest that the British government's austerity policy has increased job losses, and indeed, one of its core aims has been to achieve large-scale reductions in public sector employment. But what are the implications for health?

This is an important question. A recent report commissioned by the government called for measures that would make it even easier to sack employees than it is now, conceding that "some people will be dismissed simply because their employer doesn't like them" but arguing that this is a "price worth paying".²⁴⁶ Although the wording of the report was unusually blunt, it reflects a widely held view among many of the government's supporters that the answer to the current financial problems is to deregulate labour markets further, with so-called "supply-side" policies.²⁴⁷ But if these policies are to be pursued, what is the price that must be paid by those who will lose their jobs? Surely, this is essential knowledge before it can be decided whether this price is worth paying? There are certainly grounds for suspecting that a growing number of people may be paying the ultimate price. Starting in 2008 suicide rates began to rise, from a 20-year low, in the UK^{7,248}, increasing by 8% among men and 9% among women from the previous year (Figure 12). Although suicides again began to fall in 2010, they are still above their 2007 values.

Figure 12. Trends in the numbers of suicides and unemployment claimants, England, 2000 to 2010, by sex.



Yet can these recent increases be attributed to the current financial crisis?^{7,249}

Commentators on an observed increase in suicides in Greece argued that it was a “premature over-interpretation” to attribute this to the crisis, as the changes were within the range of annual statistical fluctuations due to the small numbers involved^{249248245200162 249}. Whether English health ministers hold the same views

about the trends in the United Kingdom is unclear as, as far as we can discover, they have been entirely silent about the factors that might explain them. Yet there is a considerable body of individual-level research from longitudinal studies that unemployment does indeed increase risks of suicide and non-fatal self-harm.^{103,250–}

²⁵² However, while suicides do tend to increase during economic downturns^{6,9,253,254}, the strength of association varies among countries and there is evidence that risks can be mitigated by strong social support and employment programmes.⁹ Conversely, it is at least possible that something else is happening to cause the

observed rise, separate from the crisis.

Much of the previous research at population level has used aggregated data from one or more countries.^{253,255,256} These studies often have few data points, lacking statistical power to identify underlying factors. However, in large countries it is also possible to take advantage of sub-national variations²⁵⁷, offering the benefit of more consistent surveillance systems and keeping those factors that act at a national level constant, such as changing access to the means of suicide.⁸² The current economic crisis in England has been unequally distributed across its regions. Since 2005 the West Midlands has experienced the greatest increase in unemployment (6.1 percentage points) whilst the South East has experienced the least (2.7 percentage points).²⁵⁸ These regional variations provide an opportunity to assess, for the first time, whether the current recession and associated rises in unemployment are significant determinants of rising suicides in the UK.

In this study, we exploit these regional differences in suicide rates and unemployment between 2000 and 2010 to test the hypothesis that those regions experiencing greater rises in unemployment have had larger increases in suicides.

While previous studies in the UK have sought to understand the reasons for a fall in suicides rates from high-levels in the late 1990s²⁵⁹, there has been no work so far, to our knowledge, seeking to understand the causes of the current increases.

4.4 Methods

Annual panel data on the number of deaths and age adjusted mortality from suicide and injury of undetermined cause were obtained from the National Clinical and Health Outcomes Database (NCHOD) covering the years 2000 to 2010.²⁶⁰ The start date of 2000 was used to compare trends over the past decade; however, we replicated our results using the first year in which data were available from NCHOD (1993). Deaths from undetermined injuries were included because this category includes cases where the coroner has given an open or narrative verdict, instead of

a classification of suicide. Since there is a great deal of variation in the practice of coroners in determining suicide, we have included undetermined injuries with suicides to provide a more consistent measure of all deaths that are likely to be suicides, following conventional practice with government statistics in the UK.²⁶¹

Data were available for 93 local areas, based on the Nomenclature of Territorial Units Statistics (NUTS) level 3 groupings of county-level local authorities and groups of unitary local authorities in England. NUTS is a geocode standard for referencing the subdivisions of countries for statistical purposes developed by EUROSTAT.^{198,199} Further details of the datasets are given in the Appendix 3.1

Unemployment was measured as the number of people claiming unemployment benefits within each region, provided by the Office for National Statistics. Although this measure does not capture all unemployment, and may understate true unemployment in a period of austerity, it is the most precise and consistent measure that is officially recorded in all regions. Claimants data are also highly correlated with unemployment statistics ($r = 0.73$, $p < 0.001$).

Statistical Analysis

The statistical analysis proceeded in two steps. In the first step we assessed the total excess number of suicides attributable to the financial crisis following standard definitions of excess by calculating the number of suicides which were over and above historical trends. Here the 'counterfactual', or what would have happened if trends had continued to decline at the pre-crisis rate, was estimated using a time-trend model. A dummy variable for the crisis years of 2008-2010 was included in the model to capture a break from past time-trends. To simplify interpretation we modeled numbers rather than rates, although our conclusions were not substantively changed when using rates. To increase precision, we modeled the excess in the recessionary period of 2008-2010, although results were similar when evaluating each year separately.

In the second step of the analysis, we assessed the association of changes in unemployment (i.e., new job losses, rather than long-term unemployment, reflecting evidence that it is the transition in employment status that is important) with suicides, stratified by region and sex using linear regression models.

At the ecological level there is potential confounding from unobserved factors that vary between local authorities, so we used a “fixed effects” approach to remove these between local authority differences.²⁶² This conservative approach involves including dummy variables for each NUTS 3 area to assess the association between area-specific deviations from the average rate of change in the unemployment and deviations from average rate of change in suicides in each NUTS3 area. Robust clustered standard errors were used to reflect the fact that populations were not sampled independently and to ensure that standard errors were robust to serial correlation in the data. Models were used to estimate the suicides attributable to changes in unemployment in the 2008 recession. All data and models were estimated using STATA v12.

4.5 Results

Total excess suicides during the recession

Prior to the economic crisis in 2008, male suicides were declining in England, at a rate of 57 per year in the period 2000 to 2007 (95% CI: 56 to 58) and female suicides at 26 (95% CI: 24 to 27) in the same period. We estimated that there were 846 more suicides among men (95% CI: 818 to 877) and 155 more suicides among women (95% CI: 121 to 189) than would have been expected if these trends had continued in the period 2008-2010.

Table 2. Time-trend analysis of excess suicides in the recession, by sex, 2000-2010

Covariate	Male Suicides	Female Suicides
Expected Annual Trend, 2000-2010	-57 (95%CI: -56 to -58)	-26 (95% CI: -24 to -27)
Estimated Excess Suicides in Recession, 2008-2010	846 (95%CI: 818 to 877)	155.0 (95%CI: 121 to 189)

Note: Excess suicide calculated as the difference between observed and expected suicides if 2000-2007 time-trends had continued during 2008-2010.

Annual associations of suicides with unemployment by sex and region

As depicted in Figure 12, and as is evident across UK regions, levels of unemployment correlate strongly with suicides among men and women ($r_{\text{male}} = 0.73$, $p < 0.001$; $r_{\text{female}} = 0.68$, $p < 0.001$) in the period studied. As noted above, to assess the specific impact of job losses during recession, rather than long-term unemployment, we evaluated short-annual changes in unemployment. Table 3 shows the associations between short term changes in job losses and suicides. Between 2000 and 2010 each annual 10% increase in the number of unemployed men was associated with a 1.4% increase in the number of male suicides (95% CI: 0.5% to 2.3%). Among women, however, these short-term associations were not statistically significant (0.7%, 95% CI: -1.5% to 3.0%).

Table 3. Association of unemployment with suicides, 93 local areas of England, 2000-2010, by sex

	Male Suicide Rates	Female Suicide Rates
10% rise in the number of male claimants	1.4%* [95% CI: 0.5% to 2.3%]	—
10% rise in the number female claimants	—	0.7% [95% CI: -1.5% to 3.0%]

*Notes: 95% confidence intervals in brackets. Model based on evaluating changes in suicides against changes in unemployment, adjusted for region-specific time-trends. Number of local area years is 1023 among men and 1017 among women. * $p < 0.001$*

Taking our estimates of the total excess suicides and the association of unemployment and suicide together, we estimated the portion of excess suicides attributable to unemployment. Relative to 2007, the number of unemployed men rose on average across the UK's regions by 25.6% each year in 2008-2010. Based on our models, this increase in unemployment was associated with yearly increases in male suicide rates of 3.6%. This percentage rise corresponds to 329 (95% CI: 126 to 532) additional suicides between 2008 and 2010, accounting for about two-fifths of the total excess male suicides during recession.

Robustness Tests

To determine whether the association between unemployment and suicides in the recessionary period differed from past trends during periods of economic growth, models were disaggregated by time period. The significant association between male unemployment and male suicides remained when analysing separately, data from 2006 to 2010 when unemployment was rising and prior to 2006 when unemployment was falling (Appendix 3.4). There was no statistically significant difference in the size of association found during these two time periods (test for effect heterogeneity, $p=0.35$).

To test the robustness of our estimates to alternative assumptions, we re-estimated: i) removing observations with large year-to-year fluctuations in suicides ($>|150\%|$); ii) fewer than 10 suicides per year; and iii) standardised residuals of an absolute value greater than 2. None of the results was changed. As the variance in the change in suicide rates depends on the number of suicides in each area, we also estimated models using weights for the annual mean number of suicides in each area. Again, none of the results were changed. Unadjusted associations yielded stronger effects (Appendix 3.2). Lastly we investigated first- and second-year lead and lagged effects, finding no significant effects (Appendix 3.3). Statistical models were also performed without adjustment for time-trends, and using the longest time-

series available from 1993, finding similar results (Appendix 3.4). Estimated associations of unemployment with suicides were similar when excluding undetermined injuries from suicide calculations (Appendix 3.5).

4.6 Conclusion

Our study estimated that the recent recession in the UK has led to about 1000 excess suicides: 846 among men and 155 among women. Our analysis indicates that increases in male unemployment were associated with about two-fifths of these rises in suicides among men in England during the current recession. Local areas that have seen the greater rises in unemployment have also experienced higher rises in suicides, although this only reaches significance among men, possibly because the suicide rates among women are only about a third of those among men. On its own, our study cannot ascertain whether the association between job loss and suicides is causal; however, the strength of the effect size, the timing, the consistency, the coherence with previous research, the existence of plausible mechanisms, and the absence of any obvious alternative explanation suggest that it is likely to be.²⁰¹ Importantly, these findings can explain why there was a small reduction in suicides in 2010, which coincided with a slight recovery in male employment.

Before evaluating the implications of our findings, we must note several important limitations. First, we undertook a population-level observational analysis; however, in contrast with previous work, we were able to take advantage of sub-regional variations in unemployment and suicide rates. Nonetheless, the analysis of sub-regional data cannot account for potential differences that emerge across employed and unemployed groups, and results may reflect increasing risks amongst both employed and unemployed people during economic downturns, for example as a consequence of uncertainty about the future among the former. Further, within local areas there may be differences in the share of the population that is most vulnerable

to the effects of unemployment, such as those with low levels of education, or with pre-existing mental health problems^{251,263}. Second, unemployment was measured using the number of claimants, which may understate the full extent that people cannot find work. To claim unemployment benefits, persons must meet certain criteria such as being capable of work and being available and actively seeking work as well as fulfilling contributory or means-testing requirements. Thus, some people may leave the employment market altogether rather than attempt to claim benefits²⁶⁴. Alternative measures, such as the Labour Force Survey, would not provide sufficiently fine-grained data for geographical analysis. Third, suicides measure a very small portion of the overall health consequences of unemployment.²⁶⁵ Fourth, analysis of suicides in small areas must be interpreted with caution because of the variability in the use of narrative verdicts by coroners and the difficulties in translating coroners' verdicts into ICD codes.²⁶¹ However, our inclusion of injuries of undetermined cause should address this in large part and such biases are likely to be relatively constant over time, making estimates of changes within regions more consistent for testing our study's hypothesis. Fifth, our estimates of the risks of suicides attributable to unemployment were based on the contemporary period, as we did not observe significant lead or lagged effects.

Our analysis, coupled with evidence from other studies⁹, has several implications for those seeking to protect the most vulnerable in the ongoing economic recession. First, our study indicates that although the initial economic shock of recession does increase suicide risk, policies that promote re-employment may reverse this trend. However, forecasts for economic growth over the next 10 years in the UK indicate that employment is unlikely to return to the pre-recession levels until after 2017.²⁶⁶ Overall, women appear less likely to inflict self-harm in response to unemployment, suggesting a greater degree of resilience among women that has been identified in other European countries.²⁶⁷ While it is possible that the study lacked sufficient

power to detect such an effect, this is likely to reflect a smaller effect size. An enhanced understanding of the role of gendered responses may help mitigate risks. However, more research is needed to understand the reasons why suicides have risen recently among women, given the absence of an association with their employment.

Second, budget cuts may exacerbate the consequences of the ongoing economic recession, both by increasing losses of public sector jobs and those in the private sector that they support, and by reducing access to preventative services. Some commentators have suggested that austerity measures in the UK are exacerbating unemployment and reducing growth and that the government should promote employment particularly in deprived areas through state-led social investment in infrastructure, industry, education, early years support and improved working conditions.²⁶⁸ Cuts to Local Authority budgets in England have been greatest in more disadvantaged areas²⁶⁹ where there are higher suicide rates. Recent increases in unemployment between 2010 and 2011 are also highly correlated with local authority budget cuts (correlation coefficient between reduction in spend per head of population and increase in male claimant rate, $r = -0.21$, $p=0.0026$) (authors' calculations).

Unemployment, and the unequal economic recovery in England, are pressing public-health issues.⁹¹ The total cost of suicide in Ireland, for example, was estimated to be about 1% of GDP in 2002.²⁷⁰ There is a danger that the human cost of continued high levels of unemployment will outweigh the purported benefits of budget cuts.

Funding

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5 Chapter 5: Study 3 - Trends in mental health inequalities in England during a period of recession, austerity and welfare reform 2004 to 2013.

This study was published as:

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5.1 Commentary on Study 3.

Links to the previous study and aims of study 3.

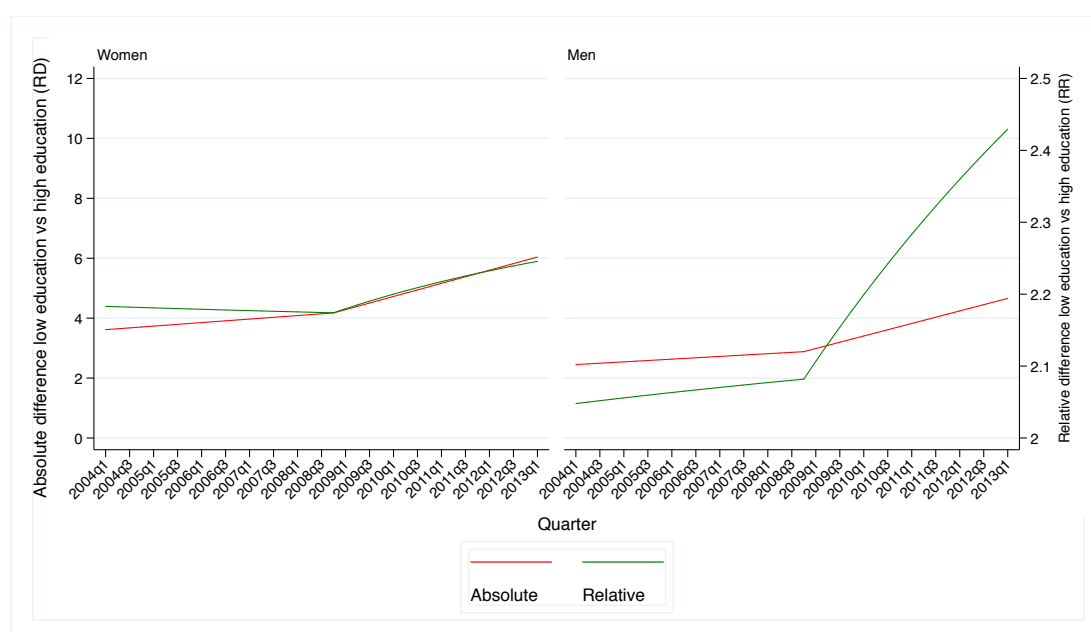
Study 2, highlighted the increase in suicides associated with the onset of the recession and how the pattern of increases in suicides across the country matched local increases in unemployment. Study 2 only investigated trends up to 2010 (the latest data available at the time of publication), and in that study we began to see some recovery in both unemployment and suicide rates in 2010.

Study 3 builds on this analysis in several ways. Firstly it includes data from 2010 to 2013 when the economy began to recover and austerity measures and welfare reforms were implemented. Secondly it uses a much broader outcome than suicides – self reported mental health problems, which is likely to capture a greater portion of the overall health consequences of the recession and welfare policies. Thirdly, as this analysis used a large national survey, it was able to examine trends by socioeconomic group to investigate trends in inequalities. The aim of this study was not to test a specific hypothesis, but rather to describe the trend in mental health problems in order to explore the potential role of three factors in explaining these trends - (1) unemployment, (2) wages, and (3) welfare reform.

Main findings of this study.

This study found that there was a significant upturn in the prevalence of people reporting mental health problems from 2009. In absolute terms inequalities widened after 2009 with the gap between low and high educated groups widening by 1.29 for women and 1.36 percentage points for men. In relative terms this was the equivalent to a 15% increase in the gap for men and a 5% increase in the gap for women. **Figure 13** shows that the trend in relative inequalities broadly reflects the trend in absolute inequalities that were reported in the published paper.

Figure 13. Estimated trend in relative and absolute gap in the prevalence of mental health problems between high and low educated groups. Estimates from model given in Appendix 4.2)



One striking finding was also the huge gap in the prevalence of reported mental health problems amongst people out of work compared to people in work. The prevalence was approximately 10-15 percentage points higher amongst people out of work. Markedly higher rates of mental health problems amongst people out of work are well recognised, although this difference does seem to be particularly stark in the Labour Force Survey data. This will of course reflect both the increased risk of

mental health problems amongst people out of work and the reduced employment chances of people with a mental health problem.

In this study I found that the trend in reported mental health problems across England mirrored the pattern of increases in suicides and antidepressant prescribing. The upturn in mental health problems from 2009 was only partly explained by trends in unemployment and wages. This suggested that there were other causes of these increases, particularly after 2010, when unemployment began to decline.

Interpretation of the results.

As outlined in the discussion section of this paper, a key issue for the interpretation of the findings of this study is whether the upturn in people reporting a mental health problems, following the recession, reflects a real increase in mental ill-health, rather than just an increase in access to diagnosis or propensity to report a mental health problem. The analysis in this study and other evidence suggests that it does reflect a real increase. Firstly increases in self-reported mental health problems over this period were greatest in those areas that also experienced the greatest increase in suicides and antidepressant prescribing. Secondly local increases in self reported mental health problems were associated with local increases in unemployment, a known risk factor for mental ill-health. The findings reported in this study were also consistent with several other studies that have reported that following the recession there was an increase in mental health problems, including an increase in diagnosis of depression in primary care²⁷¹, an acceleration in the prescribing of antidepressants,²⁷² and an increase in common mental health problems assessed using a validated symptom scale.²⁷³ It could be argued that GPs were sensitized to issues of anxiety/depression during the recession particularly in areas that experience the greatest rises in unemployment, resulting in increased diagnosis in those areas. As I have shown in Chapter 2, whilst there has been a long term

increase in the proportion of people with symptoms of common mental health problems, who report that they have a mental health condition, this trend did not change in the recession and this trend did not vary across the country, suggesting that there was not a change, from existing trends, in the propensity of people to report a mental health problems after the recession. Whilst a change in access to care or the behaviours of clinicians could explain some of the increase in self reported mental health problems it would not explain the association between increases in self reported mental health problems in an area and increases in suicides in that area.

The implications of this study.

This study has important implications for the thesis. It demonstrates how inequalities in mental health problems have widened in recent years. It replicates the findings of study 2, showing an association between unemployment and mental health problems. It broadens this analysis to also investigate the impact of falls in wages, a further pathway, identified in chapter 2, through which recessions might influence mental health. We find, however, that falls in wages only have a very small effect. The combined effect of increased unemployment and falls in wages only partly explains these increases in mental health problems. This leads to the conclusion that there may be other factors that explain the continued increase in mental health problems particularly after 2010, when unemployment began to fall. This leads to the hypothesis that welfare reforms implemented during this time potentially explain some of this increase, a hypotheses that is then tested with respect to one specific policy in study 4.

Author Contribution. BB was lead author and guarantor. He planned the study, conducted the analysis, and led the drafting and revising of the manuscript. PK and MMW contributed to data interpretation, manuscript drafting and revisions. All authors agreed the submitted version of the manuscript.

Trends in mental health inequalities in England during a period of recession, austerity and welfare reform 2004 to 2013.

5.2 Abstract.

Several indicators of population mental health in the UK have deteriorated since the financial crisis, during a period when a number of welfare reforms and austerity measures have been implemented. We do not know which groups have been most affected by these trends or the extent to which recent economic trends or recent policies have contributed to them.

We use data from the Quarterly Labour Force Survey to investigate trends in self reported mental health problems by socioeconomic group and employment status in England between 2004 and 2013. We then use panel regression models to investigate the association between local trends in mental health problems and local trends in unemployment and wages to investigate the extent to which these explain increases in mental health problems during this time.

We found that the trend in the prevalence of people reporting mental health problems increased significantly more between 2009 and 2013 compared to the previous trends. This increase was greatest amongst people with low levels of education and inequalities widened. The gap in prevalence between low and high educated groups widened by 1.29 percentage points for women (95% CI: 0.50 to 2.08) and 1.36 percentage points for men (95% CI: 0.31 to 2.42) between 2009 and 2013. Trends in unemployment and wages only partly explained these recent increases in mental health problems. The trend in reported mental health problems across England broadly mirrored the pattern of increases in suicides and antidepressant prescribing.

Welfare policies and austerity measures implemented since 2010 may have contributed to recent increases in mental health problems and widening inequalities. This has led to rising numbers of people with low levels of education out of work with mental health problems. These trends are likely to increase social exclusion as well as demand for and reliance on social welfare systems.

5.3 Background

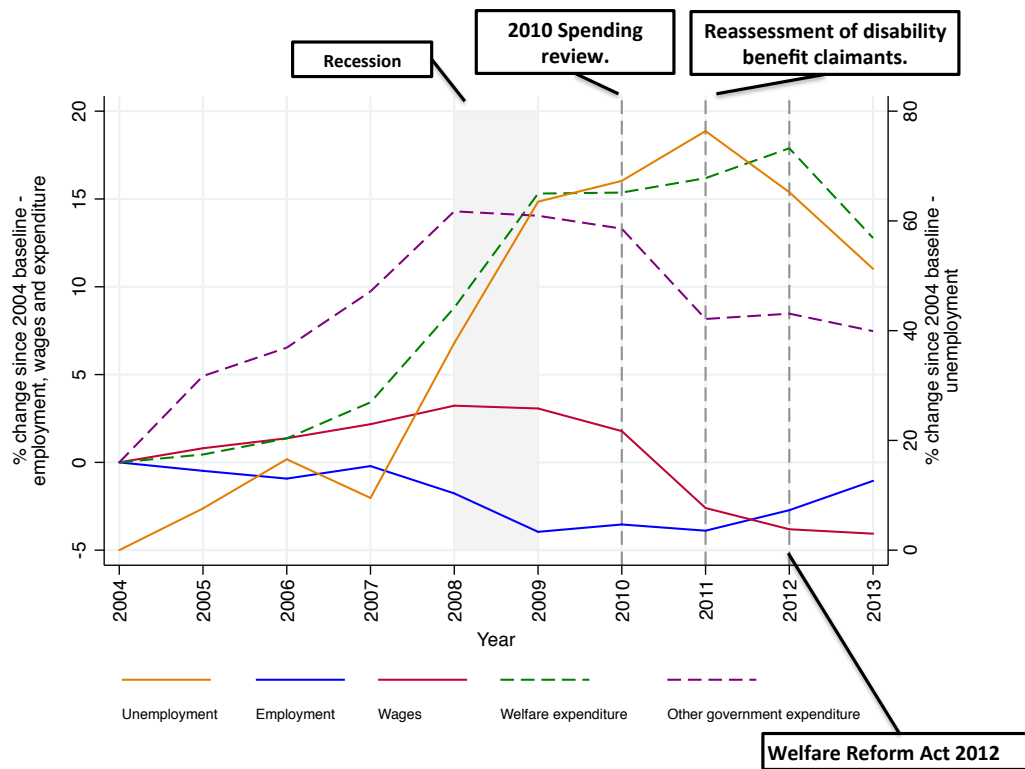
In England the onset of the recession in 2008 and subsequent rises in unemployment were associated with an upturn in suicides²⁷⁴ and an increase in other adverse mental health outcomes.^{272,275} Whilst a deterioration in mental health during recessions has been reported in many studies, these trends have tended to reverse once unemployment levels have fallen.²⁷⁶ This has not, however, been the case in England in recent years. Several indicators of mental health have continued to deteriorate even after the economy began to recover, with suicides reaching a 13 year high in 2013.^{191,272,274,275}

This continued deterioration of mental health could be the result of either economic trends that have occurred since the recession, the policy response to the recession or both. During the recession employment reached its lowest point in 2009 and remained at this level until 2011 when it began to recover (see Figure 14). For people in work, however, wages started to deteriorate from 2010 and this continued into 2013 - the largest continuous fall in real wages for at least 50 years²⁴ (see Figure 14). It is possible that the prolonged period of lower levels of employment (and higher unemployment) experienced in the recent recession along with the fall in wages since 2010 explain this continued deterioration in mental health.

It is also possible that policies implemented in recent years have adversely affected mental health, exacerbating the effects of the recession. In 2010 the Conservative-led coalition government began implementing policies to reduce the public deficit that had rapidly increased during the recession.⁵⁵ The 2010 spending review

introduced severe cuts to local government budgets adversely affecting the provision of local social welfare services (see Figure 14).⁶⁰ From 2010, in order to reduce expenditure on disability benefits, the government implemented a programme to reassess the eligibility of 1.5 million claimants of the main out of work disability benefit – Incapacity Benefits. [10,11] In 2012 the Welfare Reform Act reduced the adequacy of some benefits, capped the total amount of benefits a family can receive, and reduced the amount of rent that is covered by housing benefit for tenants with a spare room – known as the bedroom tax²⁷⁷ (see Figure 14). Many of these changes have particularly affected people with disabilities, leading to a rise in poverty amongst this group²⁷⁸ These austerity measures have not affected all groups equally. Cuts to local government budgets have hit the poorest parts of the country hardest^{58–60} and the effect of tax and benefit reforms has largely been regressive, with low income households of working age losing the most.⁶¹

Figure 14. Change in employment, unemployment, wages and government expenditure 2004-2013, and timing of major austerity and welfare policies. Welfare expenditure includes spending on unemployment benefits, incapacity and disability benefits, housing benefits, child benefits, tax credits and other social security benefits. Other government expenditure includes all national and local government expenditure excluding spending on welfare benefits. Source: Office for National Statistics, Office for Budget Responsibility.



Both the economic trends and the recent policies outlined above may have influenced trends in mental health. There are also reasons to think that these trends might have affected some groups more than others. There has been limited investigation of the groups most affected by trends in mental health problems since the recession therefore limited understanding of the potential causes of more recent trends. Those studies that have investigate recent trends in mental health inequalities have only included data up to 2011 ^{113,273}. We therefore used data from the quarterly Labour Force Survey to investigate trends in self reported mental health problems, by socioeconomic group, gender, employment status and local authority area in England between 2004 and 2013, to investigate whether there was

an increase in reported mental health problems during this time, when any increases occurred, which groups were most affected and the extent to which these trends were explained by recent economic trends. We then discuss the potential role of recent welfare and austerity policies in explaining these trends.

5.4 Study Design

Data sources and measures.

We analysed trends in the prevalence of mental health problems using the Quarterly Labour Force survey (QLFS). The QLFS is made up of a rolling panel with each household interviewed for 5 consecutive quarters, the first wave of the QLFS is face-to-face while waves 2-5 are by telephone.¹⁹² We included all respondents aged between 18 and 59 from England who were in each of the quarterly surveys between the first quarter of 2004 and the first quarter of 2013. We did not include data from beyond 2013 quarter 1, because the question indicating longstanding illness changed at this point. We only included respondents from England as other datasets were not comparable across other parts of the UK. We excluded respondents in full time education and those with missing data on longstanding illness (0.2%) and education (2%), giving a sample size of 1,554,837. We limited the age range to 18-59, because a large proportion of respondents aged 16 and 17 were in full time education and data on education was not available for women over the age of 59 for all quarters in the QLFS. Response rates in the QLFS have declined over time following an approximately linear trend from 64% in 2004 to 49% in 2013. (see Appendix 4.1) To adjust for response bias we weighted all analysis using survey weights provided by the Office for National Statistics (ONS).

In the QLFS respondents were initially asked if have any health problems or disabilities that they expect will last for more than a year, they are then asked to indicate from a list of health problems which ones they have. We defined respondents as having a mental health problem if they reported they had any of the

following: depression, bad nerves, anxiety, mental illness, phobias, panics or other nervous disorders (see Appendix 4.1 for details of the questions involved). Whilst this measure has its limitations in that it has not been validated against other measures of mental ill-health, and will not include people with mental health problems who are unaware of their condition or unwilling to report it, it has the advantage of having been collected consistently on a very large population sample every quarter over this time period. The prevalence of mental health problems reported using this measure broadly reflects levels of diagnosed mental health problems reported in primary care registers.²⁷⁹ In further analysis outlined below we compare trends in this measure with trends in other indicators of mental health problems as a sensitivity test.

Two educational groups were defined, those who left full time education before the age of 17 (low-educated group) and those who continued in full time education after this point (high-educated group). Employment was defined using the International Labour Organisation (ILO) definition of having undertaken paid employment during the survey reference week ²⁸⁰.

In additional analysis outlined below we used quarterly data on unemployment rates in each local authority measured as the proportion of the working age population claiming unemployment benefits, the annual median wages of residents in each local authority area ¹⁹⁸, annual suicides rates per 100,000 in the working age (18-64) population ²⁸¹ and antidepressant prescribing rates per 100,000 population.¹⁹⁵

Statistical Analysis

The analysis followed five stages. Firstly we investigated trends in the prevalence of self-reported mental health problems for England as a whole, and separately by gender, educational level and employment status each quarter between the first quarter of 2004 and the first quarter of 2013. Rates were adjusted for age using the European Standard Population and 95% confidence intervals were calculated.

Secondly we used segmented linear regression to estimate whether there was a significant change in the trend in self-reported mental health problems during this time period. This involved estimating a linear regression model with the quarterly prevalence as the outcome and two linear spline terms for time as independent variables that allowed for separate trends before and after a specified time point (breakpoint). We assessed whether there was a change in trend by iteratively comparing regression models with all potential breakpoints between 2004 quarter one and 2013 quarter 1 and selecting the breakpoint that resulted in the model with the lowest residual mean squared error.²⁸² (see Appendix 4.2 for further details) We then assessed whether this change in trends differed by gender and educational group by fitting a regression model to prevalence data disaggregated by educational level and gender and including interactions between the time trend terms and variables indicating gender and educational level. We used this model to estimate whether the gap in the prevalence of mental health problems between high and low educated groups had changed over time. Between 2009 quarter 4 and 2010 quarter 1 there was a change to the introduction provided by interviewers to respondents at the start of the health module in the QLFS. The ONS has noted that this change resulted in a small increase in the proportion of the population reporting a health problem.²⁸³ We therefore included a dummy variable in this regression model to account for this discontinuity (see Appendix 4.2).

In the third stage we used the QLFS to calculate the age adjusted prevalence of self-reported mental health problems for each of the 149 upper tier local authorities in England (The City of London, Rutland and the Isles of Scilly were excluded due to their small population size) in each quarter between 2004 quarter 1 and 2013 quarter 1. We used a fixed effects panel regression model to compare trends in the prevalence of mental health problems with local trends in unemployment and wages to investigate the extent to which these explained any increase in mental health

problems over this time period. This linear regression model included the quarterly local authority prevalence as the outcome, local authority unemployment rates and median wages as exposures, a fixed effect for each local authority (i.e a dummy variable for each local authority) and two linear spline terms for time with a break points as identified in the analysis at stage 2. As this model includes a fixed effect for each local authority it controls for any unobserved differences between areas and just assesses the association between trends in exposures and outcomes within local authorities. (see Appendix 4.3 for further details).

To indicate the contribution of these economic trends to increases in mental health problems since the recession we used the parameters from this model to predict the trend in mental health problems in England that would have been expected under four scenarios: (1) assuming unemployment and wages as observed over this time period, (2) assuming unemployment rates had not increased from the pre-crisis level in 2007 quarter 4, (3) assuming wages had also not fallen from their peak in 2009, and finally (4) assuming there was no change from the pre-crisis trend in mental health problems.

In the fourth stage we investigated whether the trends in self-reported mental health problems reflected real changes in population mental health rather than just changes in the propensity of people to report a mental health problem, by comparing local trends in self reported mental health problems with local trends in suicides and antidepressant prescribing. This involved estimating fixed effects regression models using local authority panel data as outlined above in stage three, with the annual suicide rate and annual antidepressant prescribing rates in each local authority as the outcomes and the annual prevalence of mental health problems as the independent variable. As suicide data was only available annually we pooled quarterly data for other variables for each year to give a panel dataset of

annual rates for this analysis. These models also included spline terms for time as outlined for the previous models (see Appendix 4.3 for further details).

In the final stage, to investigate the combined effect of the changing trend in the prevalence of mental health problems by educational group and employment status we calculated the percentage of the working age population in the QLFS who reported being both out of work and having a mental health problem in each quarter and stratified this by sex and educational group.

5.5 Results

Trends in mental health problems.

Figure 15 shows the overall quarterly trend in the prevalence of mental health problems between 2004 and 2013 along with the fitted results from the segmented regression model.

The segmented regression analysis indicated that there was a significant break in the trend between the last quarter of 2008 and the first quarter of 2009. From this point to the first quarter of 2013 the increase in mental health problems was significantly greater than the trend between the first quarter of 2004 and the last quarter of 2008. The prevalence of mental health problems increased by an additional 0.08 percentage points each quarter (95% CI: 0.06 to 0.1) from the end of 2008, over and above the previous trend.

Figure 15. The prevalence of self reported mental health problems for people aged 18-59, 2004-2013 and fitted values from segmented regression model. Rates calculated from the QLFS and adjusted for age and sex. Vertical lines indicate 95% confidence intervals. Fitted values derived from regression model given in Appendix 4.2.

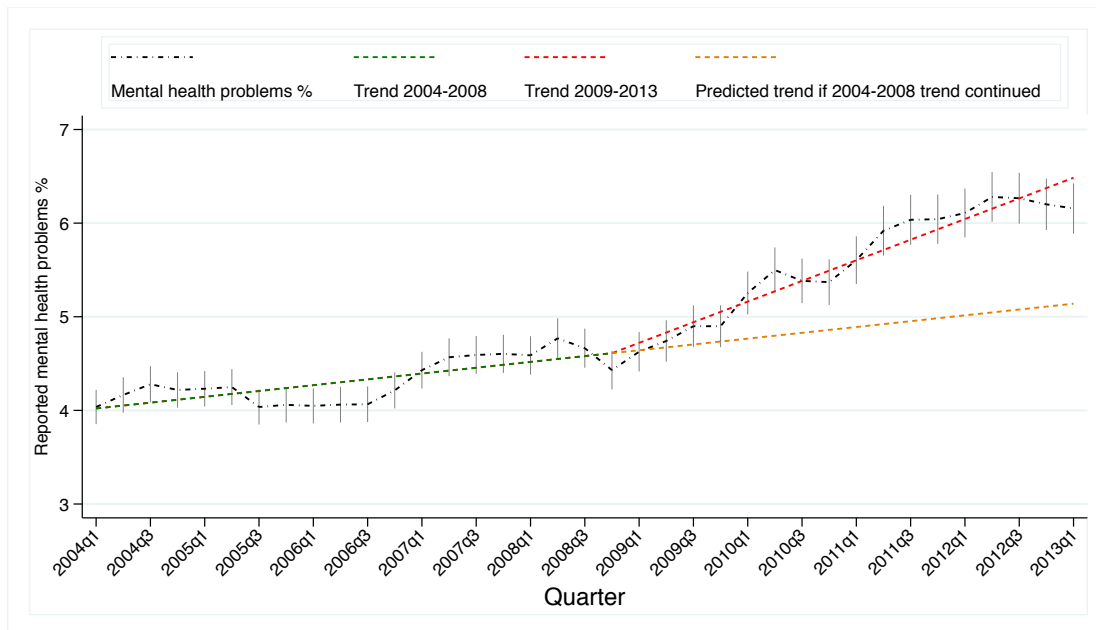


Figure 16 shows these trends separately by gender and educational groups. The prevalence of mental health problems in low educated men and women was markedly higher than amongst high-educated groups - an approximately 2 fold difference. Since the end of 2008 the prevalence of mental health problems increased more amongst low educated men and women than amongst high educated men and women and inequalities have widened. Between 2008 quarter 4 and 2013 quarter 1 the absolute gap in the prevalence of mental health problems between low and high educated groups widened by 1.29 percentage points for women (95% CI: 0.50 to 2.08) and 1.36 percentage points for men (95% CI: 0.31 to 2.42). (see Appendix 4.2 for further details).

Figure 16. The prevalence of self reported mental health problems for men and women aged 18-59, by educational group 2004-2013. Rates calculated from the QLFS and adjusted for age, vertical lines indicate 95% confidence intervals.

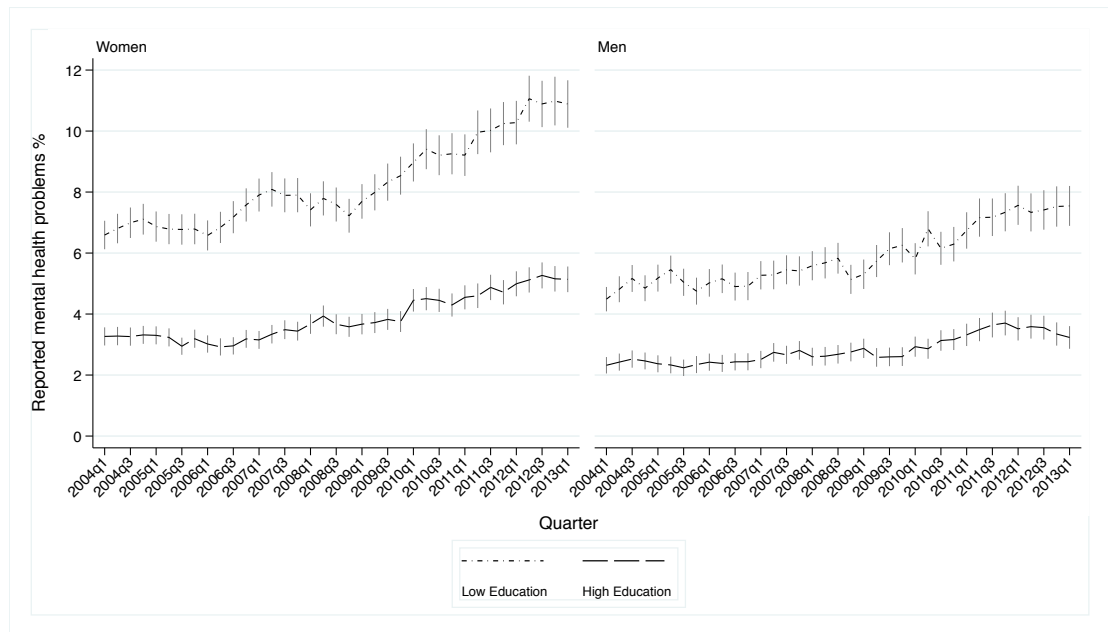
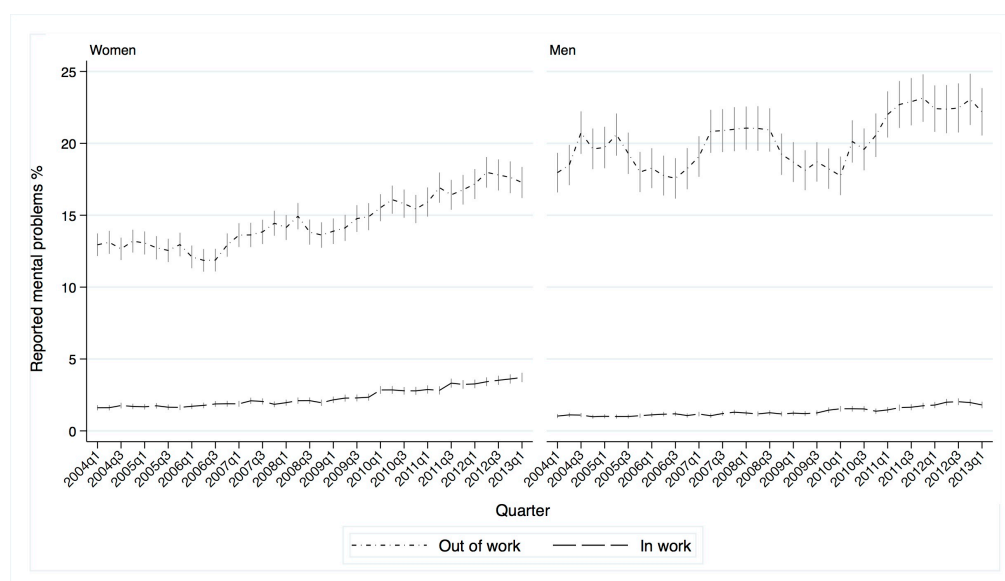


Figure 17 shows the trend in the prevalence of mental health problems amongst men and women, in and out of work. The prevalence of reported mental health problems was far higher amongst people out of work compared to people in work – approximately 10-15 percentage point higher in 2004, and this gap increased over time. In absolute terms recent increases have been highest amongst people out of work, although there have also been increases in the prevalence of mental health problems amongst people in work.

Figure 17. The prevalence of self reported mental health problems for men and women aged 18-59, in and out of work 2004-2013. Rates calculated from the QLFS and adjusted for age, vertical lines indicate 95% confidence intervals.



Association between local trends in mental health problems and economic trends.

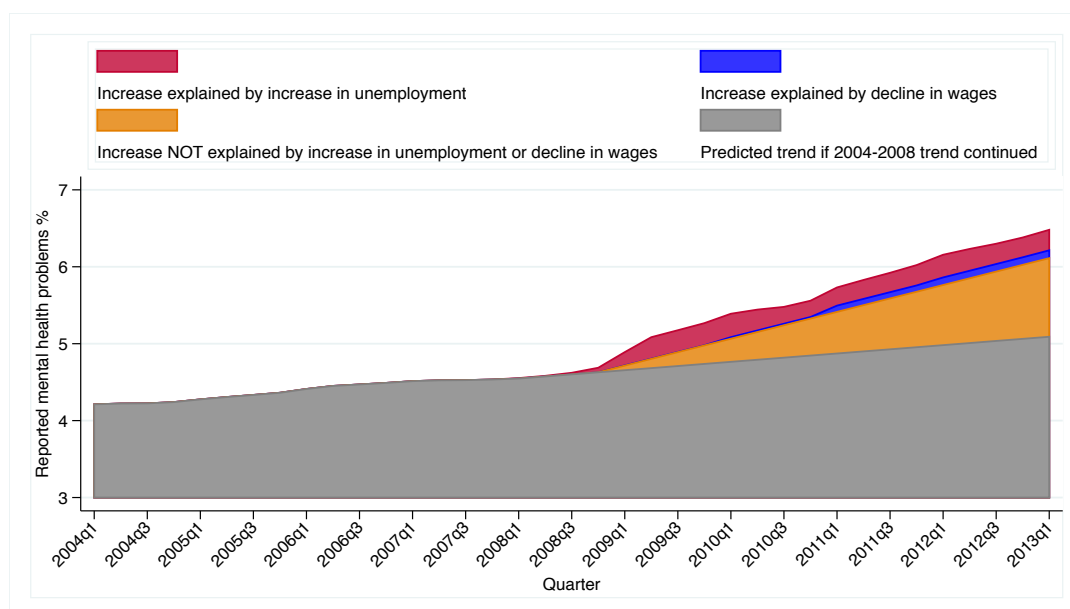
Table 4 shows the results of the regression model investigating the association between Local authority trends in mental health problems reported in the QLFS between 2004 and 2013 and local trends in unemployment and wages. For each percentage point increase in unemployment, the prevalence of mental health problems increased by 0.15 percentage points [95%CI 0.08 to 0.23], for each £10 decline in median weekly wages in an area the prevalence of mental health problems increased by 0.03 percentage points [95%CI 0.004 to 0.06].

Table 4. Increase in prevalence of mental health problems (%) in each local authority area associated with increases in unemployment and declines in median wages.

	Increase in prevalence %	95% CI	p
1% increase in unemployment rate.	0.15	[0.08,0.23]	<0.001
£10 decline in real weekly wages.	0.03	[0.004,0.06]	0.03

The parameters from this model were then used to estimate the extent to which these economic trends explained the observed increase in mental health problems (see Figure 18). Rises in unemployment explain some of the initial increase in mental health problems in 2009 with declining wages explaining a small proportion of the increase from 2011. The majority of the increase in mental health problems (64%) however was not explained by these economic trends.

Figure 18. The increase in the prevalence of self reported mental health problems explained by trends in unemployment and wages - estimated from panel regression model given in Appendix 4.3.



Association between local trends in mental health problems and trends in suicides and antidepressants prescribing.

Table 5 shows the results of the regression model investigating the association between Local authority trends in reported mental health problems and local trends in suicides and antidepressant prescribing. Local authority trends in mental health problems reported in the QLFS between 2004 and 2013 were significantly correlated with local authority trends in suicides and antidepressant prescribing (see Table 5.) In other words the areas in England that experienced the greatest increase on the prevalence of mental health problems also tended to experience the greatest increases in suicides and the prescribing of antidepressants. The strength of association estimated from these regression models was the equivalent to an additional 1.6 suicides and the prescription of an additional 3710 antidepressant items for every additional 10,000 people reporting a mental health problem.

Table 5. Increase in suicides and antidepressant items prescribed in each local authority area associated with each additional 10,000 people reporting a mental health problem.

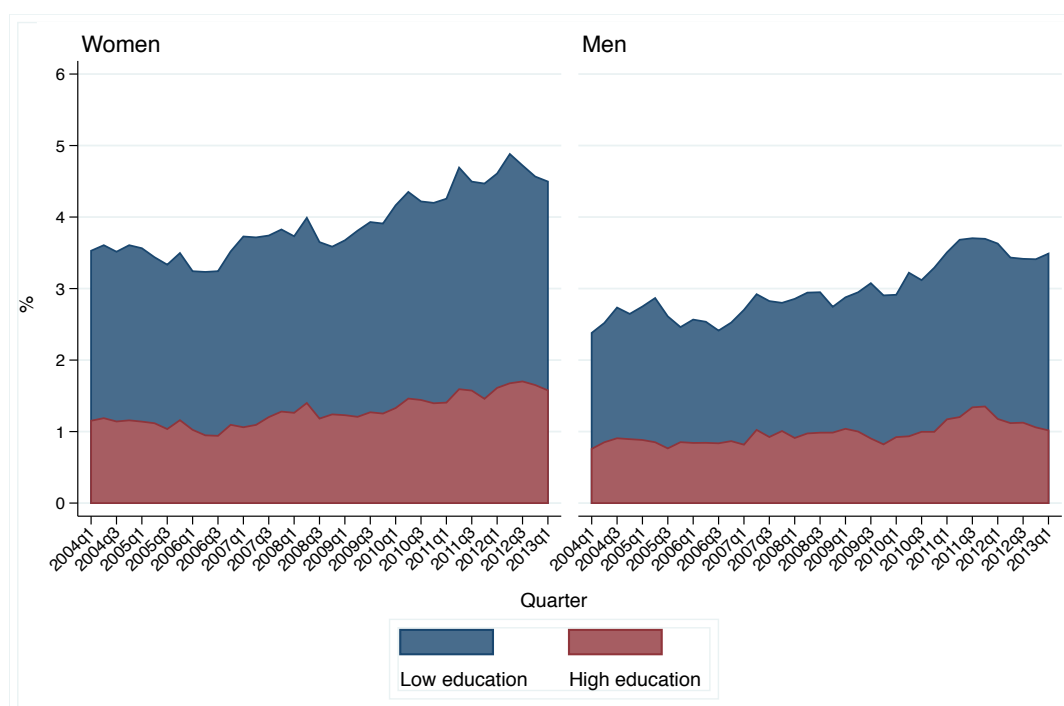
	Number	95% CI		p
Increase in suicides associated with each 10,000 people reporting a mental health problem.	1.6	0.3	3	0.018
Increase in antidepressant items prescribed associated with an increase of 10,000 people reporting a mental health problem.	3710	1790	5640	<0.001

Trends in the proportion of the population out of work with a mental health problem.

The proportion of the working age population who were both out of work and reported a mental health problem increased for men from 2.4% (95% CI: 2.2 to 2.6) in 2004 quarter 1 to 3.5% (95% CI: 3.2 to 3.8) in 2013 quarter 1 and for women from 3.5% (95% CI: 3.3 to 3.8) in 2004 quarter 1 to 4.5 (95% CI: 4.2 to 4.8) in 2013 quarter 1 (see Figure 19). In other words the proportion of 18-59 population out of work with a mental illness increased by 1 percentage point, the equivalent to an

additional 356,000 people out of work with a mental health problem in England. This proportion was fairly stable up to 2007 but increased from that point. This increase was largely amongst men and women with a low level of education.

Figure 19. The proportion of working age (18-59) men and women who were both out of work and reported a mental health problem each quarter in the QLFS, by educational level.



5.6 Discussion.

We found that there was a significant increase in the trend in reported mental health problems since 2008 and that inequalities between people with high versus low levels of education widened since this time. Increases have been greatest amongst people out of work. Overall trends in unemployment and declines in wages explained 36% of this increase. However as declines in wages only had a small effect and unemployment did not increase markedly after 2009 these economic trends did not explain why the prevalence of mental health problems continued to increase between 2010 and 2013. The overall result of all of these trends has been a large increase in the proportion of the working age population facing the multiple

disadvantages of being out of work, having a low level of education and reporting a mental health problem.

As well as being influenced by underlying trends in mental health, trends in self-reported mental health problems will be sensitive to changes in access to diagnosis and treatment and the degree of stigma associated with reporting a mental health problem. A key issue for interpretation of the findings of this study is therefore whether the increase in people reporting a mental health problem in the QLFS reflects a real increase in mental ill-health. From our analysis, there are reasons to think that there has been a real increase in the prevalence of mental health problems, not just in the willingness to report them. Firstly, the trends were relatively stable until the end of 2008 when there was a significant change in trend. There is no reason to think that there was a sudden increase in access to diagnosis and treatment or a significant decline in stigma at this time. Secondly we found that increases in unemployment, a known risk factor for mental ill-health, was associated with increased prevalence of self reported mental health problems. Thirdly, we found that increases in self-reported mental health problems over this period were greatest in those areas that also experienced the greatest increase in suicides and antidepressant prescribing.

As with other research we find an increase in mental ill-health associated with the rises in unemployment that occurred during the recent recession.^{11,113,273,274} We found, however, that this increase started in 2009 slightly later than the initial increases in unemployment that occurred in 2008 and that the increased trend continued into 2013. A study using the General Health Questionnaire (GHQ) also found an increase in mental health problems in 2009.²⁷³ In contrast to our study, however, they found, that mental health problems declined again in 2010 and there was no increase in inequalities during this time. An analysis of suicides during the recession also found no increase in inequalities.¹¹³ There are a number of possible

explanations for these differences from our findings. Firstly the measure used in this analysis reflects chronic forms of mental ill-health that are expected to last for more than a year. Trends in these more longstanding conditions may have followed a different socioeconomic pattern than other measures such as the GHQ, which is also known to have lower sensitivity in more disadvantaged groups¹⁹⁴. These previous studies also only included data up to 2010 and much of the increase in inequalities we observe occurred after this time.

We also observed that declines in wages that occurred after 2009 were associated with increases in mental health problems, however the association was very small and this only explained a very small proportion of the overall increase in mental health problems. The relatively small effect of trends in wages could reflect the role of welfare policies in mitigating the effect of falls in wages for those on low incomes. There was a large rise in tax credits over this time that compensated people on low incomes for this loss of wages. The declines in wages also tended to affect all income groups and there was no increase in income inequalities at this time²⁴ It is therefore unlikely that trends in wages explain the increase in inequalities in mental health problems that we observe in this study.

If these trends in wages and unemployment only partly explain the increase in mental health problems since 2009 and are unlikely to explain the increases in inequalities we observe, what are the other potential explanations? Firstly whilst employment increased from 2011, this increase was partly in more precarious forms of work, including part time work, zero hours contracts and self employment.^{24,284} Previous research has shown that these more precarious forms of work are associated with a deterioration in mental health^{285,286}. The rise in mental ill-health that we observed amongst those in work could be related to these economic trends. The increase in more precarious forms of employment has disproportionately affected women,²⁸⁴ which could explain why the increase in mental health problems

was greater for women in work than men in work (see Figure 17). However these changes in the nature of employment are unlikely to explain the larger increase in mental health problems we observe during this time amongst people out of work,

Secondly it could be the case that welfare reforms implemented since 2010 have adversely affected mental health. Several anecdotal reports of recent welfare reforms have reported detrimental effects on people's mental health ^{147–150} The pattern of increases in mental health problems that we observe in this study – with increases greatest amongst people out of work with low levels of education – is consistent with the groups most adversely affected by recent welfare reforms. ⁶¹

There are a number of pathways through which welfare reforms might impact on mental health. It is likely that reducing the adequacy of or entitlement to benefits, from people who are not able to secure adequate income through employment, will adversely effect mental their health. ¹⁰³ Recent reforms to welfare benefits have also increased conditionality including greater requirements to engage in job search, training or unpaid work placements ^{48,49} This has led to an increase in the severity and number of the sanctions applied to those that fail to comply with conditions ^{48,49} and there is evidence that these are putting people at risk of severe poverty. ^{287,288} These welfare reforms are also potentially increasing the stigmatization of welfare recipients, which may damage their mental health, ⁶⁹ with negative representations of welfare recipients in the media increasing substantially in recent years. ¹⁵²

The result of the increase in levels and inequalities in mental ill-health that we observe in this study has been an increase in the proportion of the population experiencing the multiple disadvantage of having a mental health problem, being out of work and having a low education. This should be of particular concern for policy makers. This multi-disadvantaged group is the least likely to enter employment in the future and the most likely to rely on welfare and social protection systems. It is likely that this group will be particularly at risk of social exclusion and other forms of

disadvantage such as poverty, homelessness, alcohol and drug related problems.²⁸⁹ Public services tend to be less effective at supporting people with severe and multiple disadvantage who then end up using crisis services, which are expensive.²⁸⁹ The UK government's welfare strategy is increasingly targeting services at people with multiple disadvantages.²⁹⁰ The increase in multiple disadvantage that we observe in this study is clearly debilitating for the people affected, however it will also potentially increase the utilisation of health and social care resources in the future.

We have found that a large increase in mental health problems and a widening in inequalities has occurred in England during a time when austerity measures and welfare policies were being implemented. These trends were only partly explained by recent trends in unemployment and wages. Effective approaches are needed to tackle the root causes of these inequalities. Focusing increasing resources on people experiencing multiple disadvantages is unlikely to be effective without addressing the inequalities that are generating these high levels of multiple disadvantages in the first place.

Data sharing. Statistical code is available from corresponding author. The data is available under Office for National Statistics Special License Access from the UK Data Archive.

Ethics.

Ethics approval was not required.

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6 Chapter 6: Study 4 - First, Do No Harm: Are Disability Assessments Associated with Adverse Trends in Mental Health? A Longitudinal Ecological Study

This study was published as:

Barr, B, D Taylor-Robinson, D Stuckler, R Loopstra, A Reeves, and M Whitehead. "‘First, Do No Harm’: Are Disability Assessments Associated with Adverse Trends in Mental Health? A Longitudinal Ecological Study." *Journal of Epidemiology and Community Health*, 2015 (in press).

6.1 Commentary Study 4.

Study 3 highlighted how the prevalence of mental health problems increased markedly from 2009, this was only partly explained by economic trends and suggested that welfare reforms introduced between 2010 and 2013 may have contributed to this increase. This hypothesis was tested in Study 4 by investigating the mental health effects of the programme to reassess the eligibility of existing claimants of disability benefits using a new tougher assessment - The Work Capability Assessment (WCA).

This reassessment policy had a number of characteristics that meant it was a good ‘natural experiment’ to investigate. It was implemented on a large scale, over a relatively discrete time period and there was some regional variation in its implementation. This variation in exposure to the policy provided an opportunity to investigate its impact on mental health, as we outline in this Study, and also on employment, as investigated in Study 5. We hypothesized that, if the WCA process did have a negative impact on mental health, then putting over a million people through this process would result in a noticeable increase in population indicators of mental health problems. It was also likely that, compared to new claimants, the cohort of people undergoing reassessment would be more sensitive to any negative

mental health effects of the WCA process, as they had generally been out of work for very long periods of time.²⁹¹

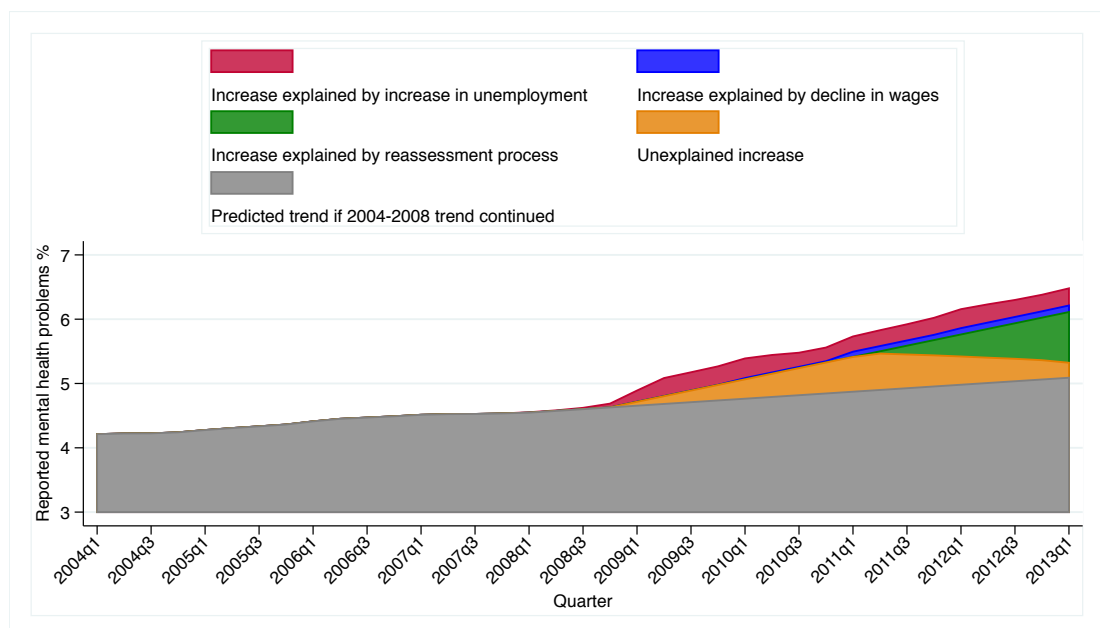
By using variation across local authority areas in the rate at which this reassessment process took place we were able to show that the policy was associated with an increase in suicides, self-reported mental health problems and antidepressant usage. As this policy was particularly targeted at more disadvantaged groups (who are more likely to be receiving disability benefits) it widened inequalities in mental health problems. This partly explains the widening in inequalities from 2009 that we observed in Study 3. Also, as suggested by the findings in Study 3, it is likely this contributed to increasing proportion of the working age population facing the multiple disadvantage of being out of work, having low levels of education and experiencing mental health problems.

In this study we estimate that 590 suicides (95% CI 220 to 950), 279,000 additional cases of self-reported mental health problems (95% CI 57,000 to 500,000) and the prescribing of an additional 725,000 antidepressant items (95% CI 406,000 to 1,045,000) were 'attributable' to the reassessment process. These effect sizes are the equivalent to 1 additional suicide for every 1800 people undergoing reassessment, an additional person reporting a mental health problem for every 4 people undergoing reassessment and just under 1 (0.7) additional prescription for antidepressants for every person reassessed. In this analysis the reassessment programme accounted for approximately 16% of the increase in suicides, 22% of the increase in mental health problems and 3% of the increase in antidepressant prescriptions. These are relatively large, but plausible effect sizes, given that the population undergoing reassessment has a high underlying risk of mental health problems. Many of the claimants will have already been receiving antidepressants prior to their reassessment and the increase in prescribing could reflect both an

increase in the number of prescriptions per person and/or an increase in new prescriptions.

As we saw in study 3 much of the increase in reported mental health problems since 2010 was not explained by trends in unemployment or wages. In study 4 we find that the reassessment process explains some of this increase, and that the effect was independent of trends in unemployment or falls in wages. Figure 18 in Study 3 showed the increase in mental health problems that was attributable to rises in unemployment and falls in wages, and highlighted the increase that was not explained by these economic trends. We can now see that the reassessment process explains an additional 22% of the rise in mental health problems (see Figure 20). This indicates that the combined effect of unemployment, wages and the reassessment explains around 59% of the increase in reported mental health problems.

Figure 20. The increase in the prevalence of self-reported mental health problems explained by trends in unemployment, wages *and the reassessment process* - estimated from panel regression model given in Appendix 4.3.



Interpretation of the results

The evidence from Study 4 is consistent with a number of anecdotal accounts and surveys of GPs and psychiatrists who have reported that this process adversely affected the mental health of their patients. More recently, after Study 4 was submitted, the Department for Work and Pensions released data showing high levels of mortality in claimants following their WCA and for the first time, a coroner has determined that the WCA contributed to a man taking his own life.^{292,293}

Whether the association between the reassessment process and the increase in mental health problems that we observe in this study is causal will depend on whether there are other confounding explanations that were not controlled for in the analysis. To act as a confounder in this analysis a variable would need to increase risk of mental health problems and have followed a trend between 2010 and 2013 within each local authority that was associated with the trend in the reassessment rate in that local authority. As we controlled for local authority fixed effects in our analysis only variables that vary over time could act as confounders. As outlined in the logic models in section 2.8, the most obvious confounders will either relate to economic trends or other austerity measures implemented during this time. We include a number of controls to adjust for these factors, including trends in unemployment, wages, regional GDP and local government expenditure. There could of course be other economic trends, that act as confounders, that are not captured by these variables, such as increases in underemployment, more precarious forms of employment or a change in financial security. We know that underemployment and self-employment increased following the recession, however the increase in underemployment was largely before 2010, and the largest rise in self-employment has been since 2013.^{294,295} Also, neither of these factors is known to increase risk of mental health problems. A reduction in financial security could be a consequence of welfare reforms and hence could be in the causal pathway

between the reassessment process and adverse mental health outcomes, rather than being a confounder. At the macro level, at least, Household debt relative to income was declining during period and therefore unlikely to contribute to increasing economic insecurity.²⁹⁶

There is the potential that our analysis is picking up the effects of other welfare policies and austerity measures. The major cut in government expenditure that coincided with the time period of the reassessment process, was the cut in local government budgets and we control for the change in this expenditure in the analysis. Other changes to welfare benefits could also influence mental health in the same areas that were affected by the reassessment process. The major recent changes were introduced with the 2012 Welfare Reform Act, and therefore came into effect after the time period of this study. Another potential confounder was the increase, during this period in the severity and number of the sanctions applied to those that failed to comply with benefit conditions^{48,49} This however, could also be in the causal pathway, with the reassessment process increasing sanctioning, which adversely affected mental health. It is quite possible that the reassessment process moved people off Incapacity Benefits onto Job Seeker Allowance (JSA) where they subsequently found they were sanctioned because they were unable to meet the more stringent conditions required of JSA claimants.

It is possible that a combination of factors related to the recession and subsequent government policies may have led to a decline in mental health in more deprived communities. These effects could include the impact of the reassessment process as well as other economic and policy trends not captured in this analysis. These could result from increases in material hardship as well as being mediated through a decline in social cohesion, trust and support networks in more deprived communities. In this study we sought to distinguish between the effects of the reassessment process and other trends that might generally affect more deprived

areas by including separate time trend terms for each quintile of deprivation as measured by the Indices of Multiple Deprivation. This essentially meant that we were investigating the association between the trend in reassessments in each area and the trend in mental health problems, whilst controlling for the average trend in mental health across similarly deprived local authorities. As the IMD 2010 includes a measure of mental health based on 2008 data, to some extent, we are comparing trends in the reassessment rate and trends in mental health problems within groups of areas with similar baseline levels of mental health problems. In practice it makes no difference if quintile groups are defined based on the full IMD score or a component of the IMD score. Only a small number of local authorities change their quintile when using different components of the IMD and using quintile groups based solely on the income or employment components did not change the results.

As the study uses ecological data it is not possible to determine if the people experiencing an increased risk of mental health problems are the same people who underwent reassessment. This does mean that the study would capture any indirect effects of the reassessment process within local areas, for example by affecting the mental health of the family members of the people undergoing reassessment. It was suggested by one reviewer that the analysis should be limited to people out of work with a disability as this is the group most likely to be affected by the reassessment process. Whilst it is possible to limit the Labour Force Survey sample to this group, this approach would introduce significant selection bias. This is because the reassessment process itself is likely to affect both employment and disability status. For example if the reassessment process resulted in people with a mental illness entering employment (as was its intention) this would decrease the prevalence of mental illness amongst people out of work without actually changing the risk of mental health problems in the population. Secondly if after undergoing the reassessment process, people with mental health problems assessed as fit for work

were less likely to report they had a disability this would reduce the prevalence of mental health problems amongst the disabled, without there being any population change in risk. Whilst limiting the analysis to a population sub group in this way would introduce bias, we did replicate the analysis amongst people over the age of 65 who *would not be affected* by the reassessment policy and as expected found no association between the reassessment process and mental health outcomes in this age group. This suggested that the results did not just reflect wider local trends in adversity that effected the whole population.

Implications of the results.

Given that health is an essential component of welfare, it is perhaps surprising that very few studies have investigated the health effects of welfare reforms such as this. Whilst the WCA has undergone 5 independent reviews none of these reviews has investigated the impact of the process on claimant's health. Study 4 was the first research that showed that this policy was associated with adverse mental health outcomes. These health effects, however, need to be balanced against any benefits that claimants might experience through improvements in their employment, as this was the stated aim of the government in implementing this policy. In Study 5, therefore, I review the international evidence for the employment effects of similar policies and in Study 6 I investigate the employment effects of the reassessment policy.

Author Contribution.

BB was lead author and guarantor. He planned the study, conducted the analysis, and led the drafting and revising of the manuscript. DTR, DS, AR, RL and MMW contributed to data interpretation, manuscript drafting and revisions. All authors agreed the submitted version of the manuscript.

‘First, do no harm’: Are disability assessments associated with adverse trends in mental health? A longitudinal ecological study.

6.2 Abstract.

Background: In England between 2010 and 2013, just over one million recipients of the main out-of-work disability benefit had their eligibility reassessed using a new functional checklist - the Work Capability Assessment. Doctors and disability rights organisations have raised concerns that this has had an adverse effect on the mental health of claimants, but there are no population level studies exploring the health effects of this or similar policies.

Method: We used multivariable regression to investigate whether variation in the trend in reassessments in each of 149 local authorities in England was associated with differences in local trends in suicides, self-reported mental health problems and antidepressant prescribing rates, whilst adjusting for baseline conditions and trends in other factors known to influence mental ill-health.

Results: Each additional 10,000 people reassessed in each area was associated with an additional 6 suicides (95%CI: 2 to 9), 2700 cases of reported mental health problems (95% CI 548 to 4840), and the prescribing of an additional 7020 antidepressant items (95% CI 3950 to 10200). The reassessment process was associated with the greatest increases in these adverse mental health outcomes in the most deprived areas of the country, widening health inequalities.

Conclusion: The programme of reassessing people on disability benefits using the Work Capability Assessment was independently associated with an increase in suicides, self-reported mental health problems and antidepressant prescribing. This policy may have had serious adverse consequences for mental health in England,

which could outweigh any benefits that arise from moving people off disability benefits.

6.3 Background

Several measures indicate that mental health in the UK has deteriorated in recent years, with suicides reaching a 13 year high in 2013 ^{190,271,273}. We have previously shown that an upturn in suicides was associated with the 2008-2010 recession,²⁷³ however these trends have continued to worsen even after the economy recovered.¹⁹⁰ Since 2010 over a million claimants of the main out-of-work disability benefit in the UK had their eligibility reassessed using a new functional checklist - the Work Capability Assessment (WCA).²⁹⁷ Doctors and Disability groups have raised concerns that this reassessment process has had a negative effect on the mental health of their patients ^{148,149,298}

The provision of cash benefits to people who are unable to work because of disability is an essential component of health and welfare systems that aim to promote the social inclusion of people with disabilities.²⁹⁹ Over recent years many countries, including the UK, the Netherlands and Australia, have introduced more stringent functional assessment checklists to reduce the growing number of people receiving disability benefits.^{300,301} Whilst in most countries these more stringent criteria have only been applied to new benefit claimants, the UK and the Netherlands have gone further - reassessing their entire caseloads.²⁹⁹ In the UK this process started in 2010 when the government initiated a programme to reassess all existing claimants of out-of-work disability benefits using the WCA. Following reassessment the claimants were either moved off disability benefits, if found to be fit for work, or otherwise were transferred to a new disability benefit scheme called Employment Support Allowance.

The WCA has been the subject of a great deal of controversy. Nearly 40% of those who have appealed against the initial assessment decision have had this decision overturned,³⁰² and 5 independent reviews have raised concerns about the fairness and effectiveness of the process. In particular the reviews indicated that the process was impersonal and mechanistic and did not adequately capture the impact of many chronic health conditions.¹⁴⁶ The government has however accepted many of the recommendations of these reviews and changed the WCA over time. Many of these changes have particularly focused on the assessment of mental health problems, including adjustments to the mental, intellectual and cognitive descriptors, additional training of decisions makers and assessors and the appointment of Mental Function Champions.³⁰³

Several anecdotal reports and surveys of doctors describe individuals experiencing a deterioration in their mental health and even suicides following their WCA.^{147–150} Psychiatrists in one survey reported that some patients had experienced an increased frequency of psychiatric appointments, medication usage and self-harm following their WCA.¹⁴⁷ These anecdotal reports, however, provide limited scientific evidence for the mental health effects of the WCA.

Both the assessment and appeals process itself, which is reported to be stressful, and the financial hardship that occurs when people are denied disability benefits, could result in negative health effects. There is good evidence that loss of income, particularly for people already on low incomes, increases risk of common mental health problems.¹⁰³ People undergoing a WCA are likely to be particularly vulnerable to the adverse mental health consequences of this policy because a very high proportion have a pre-existing mental health problem.⁶⁴ A previous study in Norway reported an increase in mental health symptoms leading up to the time when new applicants began receiving disability benefits,³⁰⁴ however this study did not

investigate how mental health changes when current recipients of disability benefits have their eligibility reassessed.

Understanding the benefits and harms of these eligibility assessments is of international importance both for the health professionals who implement the assessments and for policy makers who need to decide on the most effective approaches. While the potential effects on employment prospects are debatable^{54,130,242}, to our knowledge no studies have assessed the impact of the disability assessment process on the mental health of the recipients. We took advantage of the variation across local authority areas in the rate at which this reassessment process took place, to investigate whether this policy was associated with an increase in three mental health outcomes collected in different datasets - suicides, self-reported mental health problems and antidepressant usage.

6.4 Methods

Setting

We used aggregate routine population and survey data for 149 upper tier local authorities in England between 2004 and 2013. (The City of London, Rutland and the Isles of Scilly were excluded due to their small population size). Analysis was restricted to England as comparable data were not available for Scotland and Wales.

Data sources and measures

We used three outcome variables in our analysis; suicides, antidepressant prescriptions and self-reported mental health problems. Age adjusted mortality rates from suicide and injury of undetermined cause in the working age population (18-64) were obtained for each local authority between 2004 and 2013 from the Office for National Statistics. We calculated quarterly antidepressant-prescribing rates per 100,000 population, for each local authority area from 2010 (the earliest available

year) to 2013 using data on antidepressant items prescribed by each GP practice aggregated up to the local authority level.¹⁹⁴ We estimated quarterly prevalence rates of self-reported mental health problems per 100,000 working age population (18-64 years old) for each local authority between 2004 to 2013 using data from the Quarterly Labour Force Survey (QLFS) adjusted for response bias using survey weights supplied by the Office for National Statistics.¹⁹¹ Details of the survey questions used are given in Appendix 5.1.

Our main exposure variable, the reassessment rate, was the cumulative proportion of the population in each local authority area that had received any outcome from a WCA as part of the reassessment process, by the end of each quarter, expressed as a rate per 100,000 population (i.e the cumulative incidence of reassessment).³⁰² We used the cumulative proportion of the population exposed as our main measure in order to investigate the accumulated effects of the policy on mental health outcomes. In additional analysis we also used the quarterly incidence of reassessment, calculated as the number of outcomes received in each local authority area during each quarter as a proportion of the population.

We also included measures of area deprivation using the Indices of Multiple Deprivation (IMD2010)³⁰⁵ and controlled for differences in economic trends between areas using the annual regional workplace based Gross Value Added (GVA) per capita (the regional equivalent to GDP), the quarterly unemployment rate (based on unemployment benefit claimant data) and the annual median wages of residents in each local authority area^{197,306}. To adjust for any local effects of changes in local authority spending we additionally controlled for annual trends in public expenditure by local authorities.³⁰⁷

Analysis

To explore the data visually, we used added variable plots³⁰⁸ to described the association between the proportion of the population reassessed in each local

authority area between 2010 and 2013 and the change in each of our outcomes (suicides, self-reported mental health problems and antidepressant prescribing) between these years, whilst controlling for baseline area deprivation. Due to the small numbers in each local authority in each year we pooled data over two years and calculated the change as the difference in each outcome between 2009-2010 and 2012-2013.

We then used linear fixed effects multivariable regression models to formally test this association whilst further adjusting for other potential confounding factors.³⁰⁸

As suicide mortality data were only available annually, annual panel data were used for this outcome, whilst for all other outcomes quarterly panel data were used. By including a fixed effect for each local authority, we effectively control for all baseline differences between local authority areas, including the baseline prevalence of benefit receipt, so that our models assessed the association between the trend in the reassessment rate and the trend in outcomes within each local authority.²³¹ As the trends in the reassessment process were correlated with economic trends (see Appendix 5.5) and these could influence mental health outcomes, we further controlled for trends in GVA per capita, median wages, and unemployment rates. As there were two changes to the health module of the QLFS questionnaire during this time in 2010 quarter 1 and 2013 quarter 1, we included dummy variables in our models to account for any discontinuities in the data at these time points. (see Appendix 5.1 for details).

We include data in these models from 2004 in order to account for pre-existing trends in our mental health outcomes. Bias could result if associations between the reassessment policy and mental health outcomes were actually due to differential pre-existing trends, that started before the onset of the policy.³⁰⁹ Therefore to adjust for these pre-existing trends we included a trend term in all models and allowed this trend to vary in the period prior to the economic crisis (2004 to 2006) and in the

period during and after the economic crisis (2007 to 2013). As the reassessment process followed differential regional trends with the North East, North West, and more deprived areas affected to a greater extent (see Appendix 5.5) we controlled for this by including separate time trends for each government office region in England and each quintile of area deprivation (IMD). In a sensitivity analysis we estimated models with simpler time trend assumptions including models with just a national level linear time trend and models just including data during the period in which the policy was implemented (2010 to 2013) (see Appendix 5.4.)

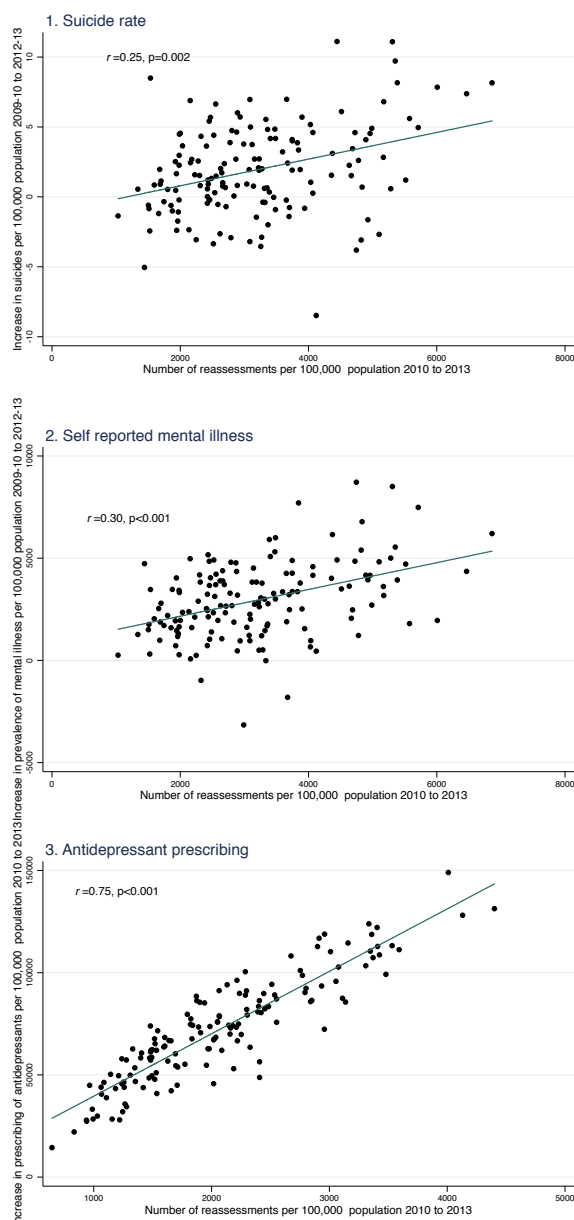
To investigate the specificity of our results we repeated the analysis using outcomes we would not expect to be influenced by the reassessment policy, but that could be affected by unobserved confounding factors. These included mental health problems and suicides in people over the retirement age of 65, heart conditions in the working age population, and items of cardiovascular drugs prescribed per 100,000 population. We further investigated whether trends in adverse mental health outcomes were a response to the reassessment rate by estimating additional models including the lagged quarterly incidence of reassessment (i.e the proportion of the population receiving an outcome from the reassessment process in the previous quarter), rather than the cumulative incidence of reassessment (see Appendix 5.4). We used robust clustered standard errors in all models to account for the longitudinal nature of the data and weighted the analysis by local authority population.

6.5 Results

Between 2010 and 2013, 1.03 million existing claimants of out-of-work disability benefits in England were reassessed using the WCA (80% of existing claimants). This is equivalent to 1,920 people experiencing a reassessment per 100,000 population. The reassessment rate varied across the country from 646 per 100,000 population in Wokingham (71% of existing clients) to Knowsley where 4,400 per

100,000 population experienced a reassessment (88% of existing claimants). As people living in deprived parts of the country are more likely to be receiving disability benefits, a higher proportion of the population in these areas experienced reassessment (see Appendix 5.2 for details). Figure 21 shows the association between the proportion of people experiencing reassessment in each local authority between 2010 and 2013 and the change in each of the mental health outcomes between those time periods, adjusted for baseline area deprivation. In those areas where more people had experienced reassessment there was a greater increase in suicides, self-reported mental health problems and antidepressant prescribing.

Figure 21. Association between the number of people per 100,000 population experiencing a reassessment in each local authority between 2010 and 2013 and the increase in suicides, self-reported mental health problems and antidepressant items prescribed during the same period, adjusted for area deprivation.



The multivariable regression analysis indicates that these associations remained after adjusting for other baseline area characteristics, economic trends and long-term trends over time in our three mental health outcomes. The estimates from these models shown in Table 6 indicate that for every 10,000 people reassessed there were approximately an additional 6 suicides (95%CI: 2 to 9), 2690 cases of

reported mental health problems (95% CI 548 to 4840) and 7020 items of antidepressants prescribed (95% CI 3930 to 10100).

Table 6. Additional adverse mental health outcomes associated with each 10,000 people in an area experiencing reassessment.

	Number	95% CI		p
Suicides	5.68	2.12	9.23	0.002
Cases of mental health problems	2700	548	4840	0.014
Items of antidepressants	7020	3930	10100	<0.001
Note : Models based on equations shown in Appendix 5.3 and included controls for local authority fixed effects, time trends 2004 to 2006 and 2007 to 2013, season, quarterly unemployment rate, annual GVA, annual median wages, annual local authority expenditure, and separate time trends by quintile of deprivation and government office region. (Full model results are given in Appendix 5.3).				

In total, across England as a whole, the WCA disability reassessment process during this period was associated with an additional 590 suicides (95% CI 220 to 950), 279,000 additional cases of self-reported mental health problems (95% CI 57,000 to 500,000) and the prescribing of an additional 725,000 antidepressant items (95% CI 406,000 to 1045,000). To put this into perspective of overall levels of these outcomes, this is equivalent to 5% of the total number of suicides, 6% of prevalent cases of self-reported mental health problems and 0.5% of the total number of antidepressant items prescribed in England. As more disadvantaged socioeconomic groups are more likely to be in receipt of disability benefits, and thus to be assessed, the reassessment policy was associated with a greater increase in these adverse mental health outcomes in more deprived areas (see Appendix 5.6).

Robustness tests.

We found no significant association between the reassessment rate and trends in self-reported mental health problems and suicides in the over 65 year old population, (i.e. people over retirement age and therefore not subject to the WCA

reassessment process). We also found no association with trends in heart conditions in the working age population, or trends in prescribing of cardiovascular drugs. (i.e. health conditions that would not plausibly be affected by the WCA reassessment process, in the short term at least). These test results suggest that the observed association between the reassessment process and mental health outcomes in the working-age population is not due to unobserved confounding. (see Appendix 5.4).

In the lagged analysis, we found that the level of reassessment in the previous time period predicted future increases in suicides, self-reported mental health problems and antidepressant prescribing. The effect sizes were significant and larger than those estimated using the cumulative measure (see Appendix 5.4). To further test for reverse causality, we investigated whether the trend in each of the mental health outcomes predicted future increases in the reassessment rate and found no significant association (see Appendix 5.4)

As our main analysis was based on aggregate data, it is possible that changes in composition of these populations could explain the results. To explore this further we analysed individual level data from the Labour Force Survey in a multi-level model further controlling for a number of individual characteristics, including age and sex, labour market status (employed, unemployed and inactive), number of physical chronic illnesses and level of education [28]. This analysis gave very similar results as that based on aggregate data (see Appendix 5.4).

In additional analysis we also controlled for differential trends by the level of rurality in each area and trends in initial assessments for out-of-work disability benefits and found these did not change our results (see Appendix 5.5).

6.6 Conclusion

We found that those local areas where a greater proportion of the population were exposed to the reassessment process experienced a greater increase in three

adverse mental health outcomes – suicides, self-reported mental health problems and antidepressant prescribing. These associations were independent of baseline conditions in these areas, including baseline prevalence of benefit receipt, long-term time trends in these outcomes, economic trends and other characteristics associated with risk of mental ill-health. These increases followed - rather than preceded - the reassessment process.

Strengths and limitations

There are several strengths to our analysis that enhance its validity. Firstly we find consistent results across three separate mental health outcomes, derived from independent data sources, reducing the likelihood that the results are due to spurious associations. Secondly our estimated effect sizes were large and statistically significant, when controlling for baseline differences between local authority areas, trends in socioeconomic factors associated with mental health and differential trends by level of baseline deprivation. We also found that the lagged reassessment rate predicted future increases in the mental health outcomes, indicating that it is unlikely that the associations that we observed are due to reverse causality.

Some limitations remain, however. As our main analysis was based on aggregate data we cannot identify whether the additional people experiencing the adverse mental health outcomes are the same people who have undergone reassessment. However, we found similar results when we used individual data on mental health problems in a multi-level model to adjust for changes in the composition of local authority populations over time.

It is possible that the association between the reassessment process and adverse mental health outcomes in our analysis was due to unobserved confounding factors. A key assumption is that the variations in local trends in the reassessment rate conditional on the other covariates in our model were not associated with other

causes of adverse mental health. As the reassessment process was targeted at more deprived areas and regions, it progressed more rapidly in these areas and a greater proportion of the population was affected (see Appendix 5.5). However we controlled for baseline differences between areas and these differential trends in the analysis. The variation in the reassessment rate that was not explained by the control variables included in our models had no obvious geographical pattern (see Appendix 5.5). Reports on the implementation of the reassessment programme indicate that there was geographical variation in the implementation process, due to technical problems, problems with recruiting staff and underestimates of the resources required in some areas to conduct the reassessments.^{63–66,310} It is unlikely that the variation that resulted from these local administrative processes was associated with other causes of adverse mental health. When we replicated the analysis, using outcomes and population groups that should not be influenced by the reassessment process but that could be influenced by unobserved confounding factors, we found that there was no significant association with these outcomes. This adds strength to the conclusion that the association between the reassessment process and adverse mental health outcomes was **not** due to unobserved confounding.

Patterns of self-reported mental ill-health and antidepressant prescribing may reflect differences in access to healthcare. We adjusted for baseline differences between areas, however, as well as separate regional time trends, which would account for most differences in access. It is unlikely that there would have been sudden increases in access between 2010 and 2013 that would explain recent increases in these measures beyond long-term trends. Analysis of suicides in small areas needs to be interpreted with caution because of the varying use of narrative verdicts by coroners.²⁶⁰ However inclusion of injuries of undetermined cause should have largely dealt with this potential source of bias, and such biases are probably

relatively constant over time, making estimates of changes within local authority areas more consistent for testing our study's hypothesis.

Policy implications

Our results have important implications for policy. The WCA and reassessment policy, was introduced without prior evidence of its potential impact or any plans to evaluate its effects. As pointed out by Petticrew “The public are frequently ‘enrolled’ in real-life policy ‘experiments’ without giving their explicit consent, or indeed without any real prospect of anyone learning anything substantial about the effects of those interventions.”[p 411]²¹² Our study provides an initial investigation of the mental health effects of this natural policy experiment, indicating that it may have had substantial adverse consequences for mental health. Health professionals are involved in carrying out a large number of these assessments every year with a further one million assessments planned for 2015.³¹¹ Given that doctors and other health professional have professional and statutory duties to protect and promote the health of patients and the public,³¹² our evidence that this process is potentially harming the recipients of these assessments raises major ethical issues for those involved. Regulators and other bodies representing health professionals should advocate for the benefits and harms of alternative disability assessment policies to be established through a well-designed trial.

In assessing the costs and benefits of policies that introduce tougher medical assessments for disability benefits, policy makers need to take into account the consequences, not only in terms of the effects on employment, but also the impact on health and the risk of poverty of people with disabilities. Our previous systematic review of international evidence²⁴² has indicated that similar policies have tended to shift people from disability benefits to other benefits (e.g unemployment benefits) rather than moving people into employment. Our study provides evidence that the policy in England of reassessing the eligibility of benefit recipients using the WCA

may have unintended but serious consequences for population mental health, and there is a danger that these adverse effects outweigh any benefits that may or may not arise from moving people off disability benefits.

As austerity measures designed to reduce public spending increasingly target social protection systems for people with disabilities, the cumulative impact of these developments needs to be assessed.^{277,313} Although the explicit aim of welfare reform in the UK is to reduce “dependency”, it is likely that targeting the people living in the most vulnerable conditions with policies that are harmful to health, will further marginalise already excluded groups, reducing, rather than increasing, their independence.

What is already known on this subject?

- Since 2010 over a million claimants of the main out-of-work disability benefit in the UK had their eligibility reassessed using a new tougher assessment.
- Doctors and disability groups have raised concerns that this process has had a negative effect on the mental health of the claimants.
- There have not previously been any studies investigating the impact of this or similar policies on mental health.

What this study adds

- Those local areas in England where there was a greater increase in the population exposed to the reassessment process experienced a greater increase in three adverse mental health outcomes – suicides, self-reported mental health problems and antidepressant prescribing.
- The reassessment policy may have had serious adverse consequences for mental health in England.

- The health impact of alternative disability assessment policies should be established through well-designed trials before they are implemented universally.

Transparency declaration

The lead author affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained.

Data sharing. Statistical code is available from corresponding author. WCA, Suicide and antidepressant prescribing data are available from the author on request. The QLFS data are available under Office for National Statistics Special License Access from the UK Data Archive.

Ethics

Ethics approval was not required.

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7 Chapter 7: Study 5 - To what extent have relaxed eligibility requirements and increased generosity of disability benefits acted as disincentives for employment? A systematic review of evidence from countries with well-developed welfare systems.

Study 4 was published as:

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“To What Extent Have Relaxed Eligibility Requirements and Increased Generosity of Disability Benefits Acted as Disincentives for Employment? A Systematic Review of Evidence from Countries with Well-Developed Welfare Systems.” *Journal of Epidemiology & Community Health* 64, no. 12 (2010): 1106–14.
doi:10.1136/jech.2010.111401.

7.1 Commentary on Study 5.

Study 4 investigated the mental health effects of the policy to reassess the eligibility of claimants of out-of-work disability benefits using a new tougher assessment – the Work Capability Assessment. Study 5 is a systematic review of evidence for the employment effects of similar policies implemented in 5 OECD countries (including the UK). This provided an initial assessment of whether it was likely that welfare policies such as the reassessment policy would improve the employment chances of people out of work with health problems.

This systematic review presented a number of methodological challenges. There have been relatively few systematic reviews of econometric evaluations of natural policy experiments and therefore I developed novel approaches for assessing the validity of these studies and for synthesising the evidence into a review. The review highlights the importance of taking into account the whole welfare system context when trying to generalise from findings in one country to another. Much of the research on this topic is from the US and it may not be valid to generalise from this context to countries such as the UK with very different social protection systems.

The review was limited to 5 OECD countries for both pragmatic and theoretical reasons. These countries all have universal health care systems, with insurance coverage not linked to employment, well-developed social protection systems and policy contexts that are more relevant for cross-country learning. The review was also part of a wider research collaboration with experts from these five countries, enabling an in-depth understanding of the policies evaluated in the studies included in the review.

All the studies identified in the review were observational econometric studies that use routinely available data to assess the impact of policy changes or variations in the level of disability benefits. As there were no existing tools for assessing the validity of these studies, I developed a tool specifically for this review. My initial observation was that the robustness of the design of any study was highly dependant on the nature of the data available and how that related to the variation in exposure that the study utilised to estimate impact. I developed a typology of 9 possible combinations of data types and variations in exposure, from the weakest – a study using ecological data and just a cross sectional comparison of variations in exposure and outcomes, to the strongest combination – a study using repeated measures on the same individuals over time, with policy exposure varying both between individuals and over time. The rest of the criteria used in the validity assessment focused on the representativeness of these datasets and the analysis methods used, applying standard epidemiological criteria that are found in a number of validity assessment tools for observational epidemiological studies. (see Appendix 6.3)

This review indicated that there was no clear evidence that changes in disability benefit eligibility requirements affected employment, but there was more evidence that benefit level was negatively associated with employment. A number of studies indicated that restricting disability benefit eligibility requirements, tended to move

people onto other benefits (e.g unemployment benefits) rather than into employment. Whilst we did find some evidence that more generous disability benefits may encourage some people to remain out of the labour market, these effects were generally smaller than the incentive effects of higher wages and the effect of local labour market conditions. This suggests that policies that increased wages or reduced local unemployment rates would tend to have a greater impact on moving people off-disability benefits and into work than policies that reduced the adequacy of benefits. We did not find any studies in this review that investigated effects on people with mental health problems in particular.

Our systematic review therefore indicated that we would expect the reassessment policy, to have a limited impact on employment and that it might have moved people from disability benefits onto unemployment benefits. It is also possible however that changes in the level of benefit paid might have resulted in more people with longstanding health problems entering employment.

Author Contribution.

BB was lead reviewer. He planned the study, conducted the searches, extracted data, and carried out critical appraisal of papers. SC was second reviewer and separately evaluated papers against the inclusion criteria and validity assessment. BB led the drafting and revising of the manuscript. SC, MMW, KT, Bo B, LN and ED contributed to interpretation, manuscript drafting and revisions. KT, Bo B, LN and ED provided country specific information of policy context. All authors agreed the submitted version of the manuscript.

To what extent have relaxed eligibility requirements and increased generosity of disability benefits acted as disincentives for employment? A systematic review of evidence from countries with well-developed welfare systems.

7.2 Abstract

Background: Reductions in the eligibility requirements and generosity of disability benefits have been introduced in several OECD countries in recent years, on the assumption that this will increase work incentives for people with chronic illness and disabilities. This paper systematically reviews the evidence for this assumption in the context of well developed welfare systems.

Method: Systematic review of all empirical studies from 5 OECD countries investigating the effect of changes in eligibility requirements or level of disability benefits on employment of disabled people.

Results: Sixteen studies were identified. Only 1 of 5 studies found that relaxed eligibility was significantly associated with a decline in employment. The most robust study found no significant effect. On generosity, 8 out of 11 studies reported that benefit levels had a significant negative association with employment. The most robust study demonstrated a small but significant negative association.

Conclusion: There was no firm evidence that changes in benefit eligibility requirements affected employment. There was more evidence indicating that benefit level was negatively associated with employment, but the only high quality study indicated that the effect was small.

7.3 Introduction

Dramatic rises in the number of people claiming disability benefits in several OECD countries over recent decades have led to concerns about the social and economic exclusion of disabled people and the costs of income support for these groups.^{314–318}

Evidence from the UK and Sweden indicates a social gradient in the employment of chronically ill and disabled people, with employment rates declining with decreasing socioeconomic status.^{319,320} Worklessness increases the risk of poverty and social exclusion which may further damage health and exacerbate health inequalities.

One aim of disability policy is to provide adequate income security to people with a health condition or impairment when they are too ill to work. Economists have long debated the effects of welfare programmes, with some arguing that the level of provision of income security benefits themselves acts as a disincentive to labour force participation.³⁸ Several authors in the US have concluded that the increase in the availability of disability benefits is responsible for most of the decline in labour force participation amongst older men in that country.^{127–129} These econometric studies have however been criticised for inaccurately estimating the disincentive effects of disability benefits.^{130,132,321} The empirical evidence that does exist to support the hypothesis that disability benefits are major disincentives for work largely comes from studies in the United States (US), but it would be unsound to generalise from the US context to countries with more extensive welfare systems. The consequences for disabled people of not being employed are very different in the US where there are fewer safety nets, no universal health care system, and health insurance is often provided through an employer and lost when a person loses that employment. There is a need to synthesise the evidence on the question of disincentives in the context of advanced welfare systems, which is the aim of this paper.

We conducted a systematic review of the evidence from 5 countries with well-developed welfare and universal healthcare systems to answer the following review question: “To what extent does variation in the generosity or eligibility requirements of disability benefit programmes affect labour market participation?” These countries have implemented numerous policies over the past 30 years to alter benefit generosity and eligibility (see Appendix 6.1), providing an opportunity to exploit these natural policy experiments. More recently, policy makers in these countries have begun to experiment with reducing the generosity and narrowing the eligibility criteria for these benefits, on the assumption that this will increase the employment of people with chronic illness and disabilities. This strategy underpins the introduction of the Employment Support Allowance in the UK in 2008, the 2008 reforms of the Swedish Sickness Insurance System, the 2003 reforms of disability benefits in Denmark and the 2004 disability benefit reforms in Norway.^{316–318,322} Whilst there has been a traditional review assessing the factors that have contributed to recent increases in disability benefits recipients in the UK ³²³, to our knowledge this is the first systematic review to address this issue and to take into account the relevance of the welfare system context.

7.4 Methods

Through our search and selection strategy we sought to identify all empirical studies from Canada, Denmark, Norway, Sweden and the UK that addressed the research question: “To what extent does variation in the generosity or eligibility requirements of disability benefit programmes affect labour market participation?” We restricted our review to studies from these countries as they all have universal health care systems, with insurance coverage not linked to employment, well-developed social protection systems and policy contexts for cross-country policy learning to be relevant.

Searches

We searched 13 databases (Appendix 6.2) from 1970 to October 2008. In addition grey literature searches were conducted on 12 relevant governmental and non-governmental organisational web sites. This included a supplemental search at the University of Copenhagen. A comprehensive list of linked search terms was used, with terms associated with the policy, the population and the outcome (Appendix 6.2). Websites were searched using a search engine which allowed for site specific searches with multiple search terms linked with Boolean commands.³²⁴

Selection

The searches identified 3077 potentially relevant studies. Following selection using the inclusion criteria in Table 7 and validity assessment detailed in Appendix 6.3, a total of 16 studies were included in the final review (Appendix 6.2).

We defined disability benefits as, “state supported income replacement benefits paid to individuals out of the labour market for over 3 months due to health problems or disabilities”. We therefore excluded studies that primarily investigated the effect of economic incentives on short term sickness absence. We also excluded studies which did not investigate the effect of disability benefit programmes on movement into or out of the labour market, e.g. those that only analysed movement between different benefit schemes. We defined eligibility requirements as any criteria or procedures the applicant needs to meet, or undergo in order to be eligible for disability benefits.

Table 7. Criteria used to select studies for data collection and validity assessment

Study Design. All quantitative study designs.
Participants/ population: Working age (16-69) people or a subset of this population in Canada, Denmark, Norway, Sweden or the UK, from 1970 to the 2008
Intervention. Changes to, or differences in, the generosity and/or eligibility requirements of disability benefits paid to individuals out of labour market for over 3 months due to health problems or disabilities.
Outcome measures: -Effect on the probability of being in employment and/or being on disability benefits. -Length of time on disability benefits. -length of time off work or not in employment.

The lead reviewer excluded papers that were considered irrelevant, based on their titles and abstracts. The remaining studies were then evaluated separately by two reviewers against the inclusion criteria and validity assessment. A standardised form was used to collect data on the key characteristics of each study and carry out the validity assessment. Where results of multiple models are given in the papers reviewed, the results of the fullest or final model are presented here.

Validity Assessment (VA)

Econometric studies were the only study type identified through this review. There are no standard tools available for the appraisal of econometric studies.³²⁵ After consultation with an expert in synthesis of econometric studies (N.Rice, York University), a simple appraisal framework was developed using core epidemiological principles for assessing validity (Appendix 6.3).^{326–328} A total of 28 studies underwent validity assessment, of which 12 were excluded by the process.^{329–339}

The excluded studies had adopted a similar strategy to that criticised by Bound (1989). Whilst they used regression models to compare the labour force participation of those with different disability benefit levels, the variation in disability benefit levels were due to the application of the benefit rules rather than a change in those rules resulting from policy decisions. The variation in benefit levels in these

studies was therefore determined to a large part by other factors such as age, level of disability, prior earnings or number of dependants, which are used in the benefits system to determine the level of benefits paid. Since each of these other factors would also have a direct effect on labour market participation it is unlikely that the regression models in these studies can accurately determine the independent effect of the benefit level. Bound (1989, 1991) argues that this analytical strategy significantly overestimates the impact of disability benefits on labour market attachment.^{130,321}

7.5 Results

Sixteen studies were included from 4 countries: 8 from Canada, 5 from the UK, 2 from Sweden and one from Norway. No studies from Denmark met the inclusion criteria. These studies investigated policies that varied both benefit generosity and eligibility requirements (see Table 8). The main findings are presented for each country separately to take into consideration the country policy and labour market context.

Table 8. The types of policy changes investigated by studies included in the review

Type of policy changes investigated	Number of studies	
Variation in benefit generosity only	9	340–348
Variation in eligibility requirements only	3	349–351
Variation in both eligibility requirements and benefit generosity as separate parameters in the same model	2	340,352
Policy change that included a combination of changes to eligibility requirements and benefit generosity	2	353,354

Studies investigating Canadian policy changes

Seven of the eight studies from Canada assessed the impact of changes in the Canadian/ Quebec Pension Plan (CPP/ QPP)^{340,341,343,349,350,355}, and one study

investigated the impact of variations in benefits from various sources³⁴² (see **Table 9**). The majority of studies (6/8) investigated effects on men only and most only reported on people over the age of 45 (7/8). Two of these studies investigated changed eligibility requirements,^{349,350} 4 investigated benefit generosity^{341–343,355} and 2 investigated both.³⁴⁰

Of the four papers that investigated changes in the CPP/QPP eligibility requirements, one of these found that there was no association between increased rejection rates (indicating more stringent assessment criteria) and labour market participation.³⁵⁰ Two studies found that some periods of relaxed eligibility were significantly associated with an *increase* in labour market participation, whilst others had no significant effect.^{340,352}

The fourth study found that a relaxation of eligibility criteria, that allowed assessors to take into account local labour market conditions in deciding on eligibility, was significantly associated with a decrease in employment.³⁴⁹

Of the six Canadian papers that investigated the effect of differences in benefit replacement rates or benefit levels, four reported that higher benefit levels or replacement rates during the late 1980s and early 1990s were associated with lower male employment.^{340–343} These studies did not control for education level^{340,342} and health status.^{341,343} One of these studies concluded that although the level of disability benefits did discourage labour force participation, the disincentive effects of low wages had a much greater effect.³⁴² Two studies found that changes in benefit levels had no significant effect.^{352,355} One of these investigated changes that occurred to benefit levels in 1973³⁵⁵ and the other investigated the effect of changes in replacement rates between 1983 and 1997.³⁵² This second study found that the effect of changing replacement rates on women was in the opposite direction to that hypothesised by the study: higher replacements rates were associated with higher levels of female labour market participation ($p=0.052$).

Table 9. Studies investigating policy changes and differences between jurisdictions in Canada

Author	Population	Study type	Description of policy under analysis	Result – regression coefficient (p-value)	Comments	V A
Campolieti (2004)[273]	Men aged 45-64	Differences in differences with individual data	1973 policy change increasing QPP benefits by \$50(CAD) a month.	Linear regression of policy change on non-employment. 45-64year olds: 0.008 (p=0.3) 45-59 year olds: 0.001 (p=0.48)	The authors concluded that all the difference-in-difference estimates suggested that the disincentive effects associated with disability benefits would be economically small and not statistically significant at that time. No control for health status or labour market conditions.	13
Campolieti and Goldenberg, (2007)[251]	Men and Women 45-64 years old	Differences in differences with individual data	Changes in the eligibility and medical screening criteria occurring in mid 1990s and differences between QPP and CPP and between CPP regions.	Linear regression of benefit rejection rates on non-participation Men 0.646 (p=0.166) Women 0.02 (p=0.297)	The authors concluded that they did not find a statistically significant negative relationship between denial rates and the labour force non-participation of older men and women. Health status not sufficiently controlled.	13
Harkness (1993) [260]	Prime aged men with self reported disability	Cross-sectional survey	Level of expected disability pension (combination of CPP, Workers Compensation, private insurance payments)	Logistic Regression of benefit level on labour force participation -0.00019 (p=0.006) Benefit Elasticity=- 2.03 Wage Elasticity= 6.33	The authors concluded that disability benefits did discourage work, but the disincentive effects of low wages were greater. Level of education not controlled.	11
Gruber (2000)[259]	Men 45-59	Differences in differences with individual data	1987 increase in the CPP benefit level to bring it to the level of the QPP	Logistic regression of policy and replacement rate on non-labour market participation in two separate models Policy change= 0.15 (OR=1.16)(p=0.02) Replacement rate: 1.344 (OR=3.8) (p=0.009) Elasticity = 0.28	The authors concluded that both models showed a significant effect of increases in benefit levels and the replacement rate in reducing labour market participation. Health status not controlled.	11
Campolieti, (2003)[267]	Men aged 45-65	Differences in differences with individual data	1989 change in CPP eligibility requirements permitting the use of socioeconomic conditions (e.g regional unemployment) in assessing eligibility for disability benefits	Linear regression of policy change on labour market nonparticipation 0.015 (p=0.016)	The authors concluded that the relaxation in eligibility requirements reduced the labour supply of older men in Canada by 1.5%. Health status, wages and benefit levels not controlled.	11
Campolieti, (2001b) [270]	Men and Women 45-65	Differences in differences with ecological data	1. Average replacement rate between 1983 and 1997 2. Relaxed CPP eligibility criteria between 1987 and 1994 3. Relaxed QPP eligibility between 1993 and 1997 4. QPP early retirement provision	Linear regression on labour force participation Men 1: Men: - 0.2450 (p=0.9), Women: 0.1341 (p=0.052) 2: Men: 0.0251(p=0.04), Women: -0.0088 (p=0.9) 3: Men: -0.0082 (p=0.2), Women: 0.0142 (p=0.02) 4: Men: -0.0478 (p<0.001), Women: 0.0008 (p=0.4)	The authors concluded that some of these estimates did not support the hypothesis that looser eligibility rules decrease participation rates since they were not statistically significant or did not have the expected sign. The change in replacement rate was not significant for men in the full model. Increasing replacement rates were associated with increased employment in women in the full model, although this was not significant. Education level was not controlled for in the models and the health status control was inadequate.	10
Campolieti(2001a)[258]	45-64 year old men	Differences in differences with ecological data	1. Replacement rate of C/QPP benefits 2. Period of relaxed eligibility in CPP (1987-1994).	Linear regression on labour force participation 1: -0.2171 (p=0.004) 2: 0.0149 (p=0.004)	The relaxed eligibility requirements in the CPP disability program did not have the expected sign in any of the regressions. The replacement rate was significantly associated with a decline in participation rates. However, these coefficient estimates were smaller and not statistically significant when the year specific effects were used instead of the linear time trend. Education level was not controlled for in the models and the health status control (regional mortality rate) was inadequate.	9
Maki (1993) [261]	45-65 year old Men	Time series ecological	1. Average monthly benefit payments in QPP/CPP as a ratio with wages 2. Difference between QPP and CPP	Linear regression on labour market participation 1: -0.2 (p<0.001) 2: -0.102 (p<0.001)	The authors concluded that higher rates of benefits were significantly associated with lower employment. Health status and education level not controlled.	8

Studies investigating UK policy changes

Five studies of UK benefit policy change were reviewed (**Table 10**). Two of the studies used the British Household Panel Survey (BHPS) to assess the impact of the 1995 Incapacity to Work Act (IWA).^{353,354} This policy included a reduction in the level of benefits paid, particularly for older age groups, and a tightening of eligibility requirements. Disney et al (2003) did not detect a significant effect from the reforms on the employment of older men with poor health.³⁵⁴ In contrast, Clasen et al (2006) concluded that the reforms made transitions from inactivity into employment more likely for 25-49 year old men ($p < 0.1$) and reduced the flow of older men (aged 50-64) from employment into long term sickness ($p < 0.1$). Neither of these studies controlled for changes in wage levels and Clasen et al (2006) did not control for changes in health status.

Two studies used aggregate time series data to investigate the effect, on labour market participation, of changes in benefit levels and replacement rates between the early 1980s and the end of the 1990s.^{345,346} Benefit levels had been increasing up to the 1995 reform, which then decreased the benefits paid to older workers considerably. They find that replacement rates³⁴⁵ and benefit levels³⁴⁶ were negatively associated with labour force participation. However, neither study controlled for health status and labour market conditions. When separate age trends were included in the model in Bell and Smith's (2004) paper the overall effect was no longer significant.³⁴⁵ Both studies found that the negative effect of benefit levels on employment was larger for people with no qualifications. Using a model that did not include replacement rates, Faggio and Nickell (2005) found significant negative effects on labour market participation resulting from falls in regional wages in low level occupations in relation to national wage levels. Another UK study analysed aggregate data from 1979 to 1984 and found that higher average replacement rates were associated with increasing numbers of people receiving benefits.³⁴⁴ However,

the model used did not control for health status or labour market conditions. Given that this period in the UK was one of rapidly rising national unemployment, this would need to be taken into consideration when interpreting the results. In a separate analysis with cross sectional data they show that unemployment was the dominant factor influencing disability benefit receipt, with higher unemployment levels in an area associated with higher disability benefit receipt.

Table 10. Studies from the UK on benefit changes

Author	Population	Study type	Description of policy under analysis	Result – regression coefficient (p-value)	Comments	VA
Disney,R, Emmerson,C Wakefield, M[272]	50-64 year olds	Interrupted times series with panel data	The introduction of the Incapacity to work Act (IWA) in 1995 replacing invalidity benefits (IVB) with Incapacity Benefit (IB). IB was not available to people over state pension age, eligibility conditions were tightened, those claiming IB no longer received an additional pension, based on earnings history, this meant that benefit level for older workers reduced by about 37%.	Fixed effects logistic regression of policy change on employment 0.10 (OR 1.11) (p=0.3)	The authors concluded that the weak results may reflect either a weak, or indeed no, relationship between the policy change and employment. Did not control for changes in wages	13
Clasen, J, Davidson J, Granssmann H, Mauer, A. [271]	men 25-64 year old	Interrupted times series with panel data	Introduction of Incapacity for work act 1995, which tightened eligibility criteria and had effect of reducing benefit level for older workers. (see above)	Hazard model of transitions, model coefficients and exact p values not reported. -25-49 year olds Employment → long term sick: No significant effect Inactivity → employment : Positive effect (p<0.1) Unemployment → long term sick: No significant effect -50-64 year olds Employment → long term sick: Negative effect (p <0.1) Inactivity → employment, No effect. Unemployment → Long term sick: Positive effect (p<0.1)	The authors concluded that the IWA made transitions from inactivity into employment more likely for 25-49 year olds. Amongst older workers the IWA decreased flow from employment into long term sick. However they also found IWA increased flow from unemployment into long term sickness, therefore the IWA didn't contribute to overall decrease in movements onto IB. Health status and wages were not controlled for in the analysis.	12
Faggio, G.,Nickell, S [264]	Men age 25- 54	Difference in differences study with ecological data	Weekly benefit rate (IB/IVB) paid to long term sick or disabled with contributory benefit entitlements between 1982 to 1999.	Linear regression of the log of the rate of benefits and wages on non-employment All: 0.037 (p=0.009) Low education: 0.089 (p=<0.001)	The authors concluded the level of incapacity benefits was positively associated with male inactivity and a much bigger impact was observed for those without qualifications. They find much larger effects associated with low regional wages. Health status and labour market conditions not controlled.	10
Disney R, Webb S[262]	Men 18-69	Interrupted time series with ecological data And cross sectional analysis	Average replacement rate from invalidity benefits between 1979-1984 The real value of benefits had been increasing during this time.	Linear regression of replacement rate (benefits/wages) on probability of IVB receipt 0.292 (p<0.001) Also include a cross-sectional analysis of various factors on employment, but this does not include disability benefits as a independent variable	The authors concluded that the trend in IVB receipt was explained by the ageing of the workforce, changes in the replacement rate, in the health status of the workforce and in income and housing tenure. However the dominant variable was unemployment. They did not control for health status, education or labour market conditions in the time series analysis.	9
Bell, B and Smith, J[263]	25-59 year old Men	Time series study with ecological data	Change in value of benefits between 1984 and 2001 resulting from increasing benefit levels prior to the introduction of the IWA in 1995 and a drop in benefit levels for some age groups following the IWA.	Regression of benefit level on labour force non-participation Elasticity=0.26 (p=0.002), however controlling for separate age trends reduced the coefficient and it became not significant.	The authors concluded that there was a sizable effect on male labour market participation of changes in benefit levels. This was particularly the case for the least educated men. Did not control for wages, health status or labour market conditions.	7

Studies investigating Swedish policy changes.

Two studies from Sweden^{347,351} investigated changes in sickness and disability insurance policies. Hesselius and Persson (2007) used longitudinal (panel) data to investigate the effects on long-term sickness absence of a 1998 reform to the Swedish national sickness insurance scheme. This reform allowed for additional compensation from collective insurance schemes, of up to 10% of wages, to be paid on top of national sickness insurance payments after 90 days of sickness absence. They found that for these people this reform was associated with an average increase in the duration of sickness absence of 4.7 days (2%).³⁴⁷ In the second study, Karlström et al (2008) used longitudinal data to investigate a 1997 change in the Swedish disability insurance scheme that abolished favourable treatment for people aged over 60. It required applicants to change occupation or residence to find a suitable job, to undertake a more stringent medical test and to engage in rehabilitation. The study did not detect any effect from the reform on the employment of older men (aged 60-64).³⁵¹ They did find, however, that the reform was associated with a decrease in transition from unemployment insurance to disability insurance, a higher transition from employment to sickness insurance, a lower transition from sickness insurance to disability insurance and increased persistence in sickness insurance. In other words, the reform resulted in people shifting between benefits and did not appear to result in increased employment. These two studies were rated through the validity assessment as having the most robust data and analytical approaches.

Studies investigating policy changes in Norway.

One study from Norway was included in the review.³⁴⁸ This investigated the effect of changes in the replacement rate in the Norwegian disability insurance scheme between 1971 and 1991. Over this period, average replacement rates rose in the

late 1970s and were unchanged or declined slightly during the 1980s.³⁴⁸ The study found no significant relationship between the replacement rate and the numbers of people claiming disability benefits. It concluded that increasing unemployment was more important than increasing benefit levels in explaining rising entry rates into disability benefits during this time period.

Table 11. Studies on Swedish and Norwegian policy changes

Author	Population	Study type	Description of policy under analysis	Result – regression coefficient (p-value)	Comments	VA
SWEDEN						
Patrik Hesselius and Malin Persson[265]	All individuals with sickness absence spells of at least 91 days	Differences in Differences approach using panel data.	A 1998 policy change in the national sickness insurance programme that allowed blue collar workers and municipal workers to claim an additional 10% of wages through compensation from collective agreements on top of the national insurance payments, after 90 days of sickness absence. Previously additional payments were deducted from national insurance.	Linear regression of policy change on duration of sickness absence. 4.66 days (p=0.001)	The authors concluded that this policy resulted in an increase in the duration of sickness absence, in this population by an average of 4.7 days. No corresponding effect was found prior to the 91st day or after the 360th day in sickness absence. Changes in health or separate time trends in educational or occupational groups are not adjusted for in the analysis.	14
Karlström,A, Palme,M, Svensson,[269]	Male workers aged 60-64.	Differences in differences approach using panel data.	1997 policy change in the Swedish disability Insurance scheme, which abolished favourable treatment for over 60 year olds including requirement to change occupation/ residence to find suitable job, a more stringent medical test and the requirement to engage in rehabilitation.	OLS regression of various transitions in and out of employment Employment→non-employment -0.0074 (p>0.1) All states→Disability Insurance -0.0104 (p >0.1) non-employment→non-employment 0.01(p<0.05)	The authors concluded that it was not possible to detect any effect on employment from the reform. There did however appear to be an anticipation effect, in that there was an increased flow into disability insurance when the reform was announced. This was 2 years before the reform was actually implemented. They did however find that the reform was associated with a decrease in transition from unemployment insurance to disability insurance and , higher transition from employment to sickness insurance and lower transition from sickness insurance to disability insurance as well as increased persistence in sickness insurance. In other words the reform resulted in people shifting between benefit systems and not into the labour market. Changes in the level of disability, wages and/or benefit level were not controlled for in the analysis	14
NORWAY						
Bowitz E[266]	Men and women 16-66	A time series approach using ecological data	Changes in the replacement rate in the Norwegian disability insurance scheme between 1971-1991. Average replacement rates rose in the late 1970s and were unchanged or declined slightly during the 1980s	An error correction weighted linear regression analysing the effect of the replacement rate on the probability of entry into disability benefits. 0.17 (p=0.16)	The authors concluded that unemployment was important in explaining rising entry rates into disability benefit, but that there was less evidence for the effect of increases in the replacement rate. No control for changing health status or educational level.	9

7.6 Discussion

Our review sought to identify the evidence available from 5 OECD countries with highly developed social welfare systems, to determine the extent to which variation in the generosity and eligibility requirements of disability benefit programmes affect labour market participation.

First, on the issue of eligibility, there was no clear evidence from these countries that changes in the eligibility requirements of disability benefits had a measurable impact on employment. Of the 5 studies that specifically addressed this issue, 1 from Canada found that relaxing eligibility was significantly associated with a decline in employment of older men³⁴⁹, 2 papers from Canada found that some periods of relaxed eligibility were associated with a significant increase in employment^{340,352} and 2 papers from Canada³⁵⁰ and Sweden³⁵¹ found no significant effect; importantly this included one of the Swedish papers that were rated as having the highest level of validity. Two papers from the UK assessed the impact of the Incapacity for Work Act which involved both a reduction in benefit levels and a tightening of assessment approach. These studies gave a mixed picture, one study demonstrated improved employment outcomes,³⁵³ whilst the other did not detect any effect.³⁵⁴ Therefore we conclude that there is insufficient evidence, and what there is equivocal, to indicate whether changes in benefit eligibility requirements similar to those studied here will have an impact on the employment of people with disabilities and chronic illness in well developed welfare states.

Second, on the issue of generosity, of the 11 studies that investigated whether the generosity of disability benefits influenced labour market participation, 8 reported that benefit levels or benefit replacement rates had a significant negative association with measures of labour market participation.^{340–347} Only one of these studies investigated the effect of benefit levels separately on the employment of women and this found no significant effect³⁵², the others only included men or were

on mixed populations. These studies all have substantial validity issues, which we discuss in more detail below. The Swedish study that was assessed as being the most robust did however demonstrate a small but significant effect with an increase in benefit of up to 10% associated with a 2% increase in the duration of long term sickness absence.³⁴⁷

Whilst several of the other studies in this review report much larger effects, there is some likelihood that the size and significance of these effects are attributable to other confounding factors and inappropriate statistical methods. We therefore conclude that whilst it is likely that at some level increased benefit generosity will reduce labour market participation, and that the majority of evidence reviewed here points in that direction, there is insufficient evidence of a high enough quality to determine the extent of that effect.

Limitations of the available evidence

All of these studies rely on “natural policy experiments”, arising from governments changing disability benefit schemes over time, or when schemes were administered differently in different jurisdictions as in Canada. As with other observational studies, we need first to assess whether the size of the effects observed could be attributable to confounding factors or could have occurred by chance.

Conventional economic analysis of welfare systems has been criticised for oversimplifying the relationship between participation in the labour market and financial incentives.³⁸ There are numerous interrelated factors that could influence whether a person developing a health problem will subsequently remain in or return to employment. To determine whether the reported results are actually the result of changes in disability benefits, these other factors need to be taken into account either in the study design or in the analysis. Potential confounding factors in these studies would include changes in labour market conditions, disability and workplace legislation, rehabilitation interventions, as well as differences in individual

characteristics such as educational level or health status. However many of the studies reviewed here had not fully taken this context into account. Four out of the 16 studies reviewed did not control for labour market conditions in their analysis.^{341,345,346,355} Seven studies used aggregate (ecological) data in which individual characteristics cannot be adequately controlled for.^{340,343–346,348,352} Even those studies using individual data often lacked sufficient controls for important individual confounders such as educational level, occupation, health status or wages.

It is recognised that these confounding issues can be partly overcome by using a “differences in differences” design and through using mixed effects models with longitudinal (panel) data.³⁵⁶ Nine of the studies in this review^{340,341,346,347,349–351,355} used a difference in difference approach. Four of the studies reviewed used longitudinal (panel) data,^{347,351,353,354} and only 2 of used both.^{347,351} Mixed effects models will however only control for unobserved individual effects if these do not vary over time. Difference in difference designs, where one group has been affected by a policy change whilst another has not, will still be susceptible to an imbalance in characteristics between these two groups particularly if this results in different trends over time within sub-groups.

The statistical techniques used by many of the studies in this review have been criticised widely in the econometric literature.^{357–359} In particular where they have not taken into account serial and spatial correlation in the dependant variable.^{357,358} Bertrand et al. (2004) demonstrate that this issue could result in difference-in-difference studies reporting a significant effect 45% of the time when in fact there is no effect.³⁵⁸

Nine of the studies in this review,^{340–345,348,349,352} had not adequately taken this issue into account in their analysis. Given the threats to the validity of many of the studies in this review conclusions are necessarily limited and indicate that there is a lack of

evidence of a high enough quality to determine the extent to which these policies will influence labour market participation of people with chronic illness and disabilities.

Policy implications.

There are various potential reasons why we found no clear evidence that changes in benefit eligibility requirements influenced employment. This may have resulted from the methodological issues discussed but it is also possible that there is actually no effect from these policies. One possible reason for a lack of effect, suggested by some papers in this review, is that changes in the eligibility structure for one benefit may result in movement into other benefit schemes rather than into the labour market.^{351,353} For example Karlstrom et al (2008) show that changes in the assessment requirements for disability benefits in Sweden resulted in increased persistence of people on sickness and unemployment benefits , but no increase in employment.³⁵¹ This indicates that changes to disability benefits need to be coordinated with developments in other welfare benefit schemes. The aim should be to increase employment rather just reducing the number of people on benefits.

Whilst we did not find sufficient evidence of a high enough quality to indicate the extent to which changes in benefit generosity affect employment, several studies indicated that wage levels and the level of unemployment, may potentially be more important influences on the employment of people with disabilities. The numbers of people on disability benefits was found to be strongly positively associated with the level of unemployment on a regional level in the UK and national level in Norway.

^{344,348} Three studies from the UK and Canada report that the low wages in available jobs were a more important predictor of decreased employment than the level of disability benefits. ^{342,345,346} Other interventions, such as increasing the number of jobs that are accessible to people with disabilities, or subsidizing their wages, may be more influential and need to be investigated. Norway, Denmark and Sweden are

characterised by high minimum wages and generous disability benefits. High minimum wages in these countries may give stronger incentives to work particularly for people with low social status, overriding the disincentive effects of high benefits.

In all five countries included in this review the employment rates of people with a chronic illness or disability decrease steeply with declining socioeconomic status.^{319,320} Two of the UK studies in this review found that the negative effect of benefit levels on employment was larger for people with no qualifications.^{345,346} This may reflect the low level of wages for unskilled labour in the UK, or that other factors related to social class are mediating the effect of benefit levels on employment. Further investigation is needed to determine the differential effects of changes in disability benefit systems on both the employment and livelihood of different socioeconomic groups

Before policy makers consider lowering and/or restricting access to disability benefits, on the assumption that it will increase employment amongst people with disabilities, they need to weigh up negative as well as positive consequences that could result from this policy. The wider negative consequences have not been assessed, but could potentially include increased poverty for people who already have health problems, possibly exacerbating health inequalities. Whilst changing benefit levels may affect the employment of some claimants at the margins, the consequences of this, in terms of loss of income, affects all claimants. If the employment effects are found to be small and leave more vulnerable groups such as people with mental health problems on reduced benefits, the negative consequences may outweigh the gains made in increasing employment.

Future evaluations of these policies need to determine the extent to which they impact, not only on the employment of people with chronic illness and disabilities, but also on their income, social inclusion and health, as well as any differential impact across health conditions and social groups.

What is already known on this subject?

- There has been a marked increase in the number of people claiming disability benefits in several OECD countries over recent decades.
- Several studies from the US have concluded that relaxed eligibility requirements and increased generosity of disability benefits are responsible for declines in labour market participation.
- There has been no previous systematic review of the evidence on the extent to which these issues have influenced the employment of people with disabilities in developed welfare states.

What this study adds

- We did not find sufficient evidence of a high enough quality, to indicate the extent to which changes in disability benefit generosity or eligibility, affected employment in developed welfare states.
- This indicates that the impact of policies reducing benefit generosity and narrowing eligibility remains uncertain.
- This level of uncertainty has important implications for policy makers who need to weigh up the benefits of this policy in terms of employment, against any negative consequences; which could include increased poverty for people who already have health problems.

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8 Chapter 8: Study 6 - Fit-for-work or fit for unemployment? Does the reassessment of disability benefit claimants using a tougher work capability assessment help people into work?

This study was published as

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8.1 Commentary on Study 6.

In Study 5, previous evidence from the UK and other similar countries indicated that policies that introduced stricter eligibility criteria for out-of-work disability benefits, tended to move people onto unemployment benefits rather than into work. Study 6 investigated the employment effects of the UK policy to reassess the eligibility of claimants of out-of-work disability benefits using the Work Capability Assessment – the reassessment policy.

As outlined in the impact assessment,²⁹¹ carried out by the government prior to implementation, it was expected that the reassessment policy would increase the chances that claimants moved into employment. The impact assessment outlines three pathways through which this was likely to happen. Firstly some claimants assessed as fit-for-work would look for and enter employment directly. Secondly some would move onto Jobseekers Allowance (unemployment benefits), where they would be required to look for and prepare for work, increasing their employment chances. Thirdly claimants assessed as eligible for disability benefits would move onto the new scheme – Employment Support Allowance (ESA). Claimants of this benefit, who are assessed as capable of work at some time in the future, are

required to engage in work-related activities and can receive return-to-work support, potentially increasing their employment chances.²⁹¹

Study 6, however, found that the reassessment process was not associated with an increase in the chances that people out-of-work with a longstanding illness entered employment. It was significantly associated with an increase in the chances that people with mental health problems moved from inactivity (i.e out of the labour market) into unemployment. This presumably reflected people moving from out-of-work disability benefits onto Jobseekers Allowance (JSA) as anticipated in the government's own impact assessment.²⁹¹

Finding no effect on employment but an effect on transitions into unemployment was consistent with prior evidence from our review (Study 5) and official reports on the programme. We know that the number of people receiving out-of-work disability benefits did not fall much below the long term trend during this time (see Figure 2))and the expected savings from reduced benefit caseloads did not materialise.⁵⁰

The Office for Budget Responsibility has reported that that some people who were declared fit for work may have initially moved onto JSA, but then returned to ESA at a later date.⁵⁰ We can see from Figure 2 in Chapter 2 that the caseload does dip slightly just after the reassessment process began, but then the numbers start to increase again in 2014.

The study suggests that some of the underlying assumptions of successive governments, about the employment of people with disabilities, may be flawed. In particular the assumption that large numbers of people with disabilities and health problems are not working because of the disincentives for work created by the welfare system. As the work of Beatty and Fothergill has highlighted, the pattern of disability benefit receipt across the country is highly concentrated in former industrial areas and in part reflects low demand for labour in these areas, rather than supply side deficits.^{360,361} A more effective approach may be to focus on improving job

opportunities for people with disabilities particularly in more disadvantaged areas and implementing evidenced based integrated case management approaches that combine support for underlying health problems with vocational rehabilitation, training and financial support.^{141–143,362}

The success or failure of welfare reform is often solely assessed in terms of its impact on benefit caseloads.³⁶³ This neglects the fact that the objective of welfare policy is to promote welfare. To judge the success of welfare reforms, therefore, we need to assess their impact on a broader set of outcomes, including employment, poverty and health. Studies 4, 5 and 6 provide some indication of the harms and benefits of policies that introduce tougher assessments for disability benefits. Their impact on employment appears to be limited, however there are potentially substantial negative effects on mental health.

Some uncertainty remains, however, about these findings. The studies outlined in this thesis have all relied on using routine data sources to investigate policies that were not implemented within the context of a trial. As discussed in Study 1, assessing the impacts of these ‘Natural Policy Experiments’ presents a number of challenges and it is not possible to attain the level of evidence observed in the evaluation of clinical interventions.

Author Contribution.

BB was lead author and guarantor. He planned the study, conducted the analysis, and led the drafting and revising of the manuscript. DTR, DS, AR, RL, SW and MMW contributed to data interpretation, manuscript drafting and revisions. All authors agreed the submitted version of the manuscript.

Fit-for-work or fit for unemployment? Does the reassessment of disability benefit claimants using a tougher work capability assessment help people into work?

8.2 Abstract

Background:

Many governments have introduced tougher eligibility assessments for out-of-work disability benefits, to reduce rising benefit caseloads. The UK government initiated a programme in 2010 to reassess all existing disability benefit claimants using a new functional checklist. We investigated whether this policy led to more people out-of-work with longstanding health problems entering employment.

Method: We use longitudinal data from the Labour Force Survey linked to data indicating the proportion of the population experiencing a reassessment in each of 149 upper tier local authorities in England between 2010 and 2013. Regression models were used to investigate whether the proportion of the population undergoing reassessment in each area was independently associated with the chances that people out-of-work with a longstanding health problem entered employment and transitions between inactivity and unemployment. We analysed whether any effects differed between people whose main health problem was mental rather than physical.

Results: There was no significant association between the reassessment process and the chances that people out-of-work with a longstanding illness entered employment. The process was significantly associated with an increase in the chances that people with mental illnesses moved from inactivity into unemployment (HR = 1.22, 95% CI 1.03 to 1.45).

Conclusion: The reassessment policy appears to have shifted people with mental health problems from inactivity into unemployment, but there was no evidence that it

had increased their chances of employment. There is an urgent need for services that can support the increasing number of people with mental health problems on unemployment benefits.

8.3 Background

In recent years several countries have experienced rising numbers of people on disability-related social security benefits.³⁰⁰ In response to this rise, many governments have introduced tougher eligibility assessments for these benefits. The aims of these policies are twofold: firstly, to boost the employment of people with longstanding health problems and disabilities by identifying those who are 'fit for work' and disqualifying them from receiving disability benefits and secondly, to reduce pressure on public finances by reducing expenditure on disability benefits.^{300,301} People with longstanding health problems are more likely to be out-of-work than other groups.³⁶⁴ This puts them at greater risk of poverty, potentially exacerbating health inequalities. Improving the employment prospects of people with longstanding health problems, who are the main recipients of disability benefits, could help reduce health inequalities.³⁰⁰ We therefore investigated whether a policy in the UK to reassesses all existing claimants of out-of-work disability benefits,³ using a new tougher assessment, led to more people with longstanding health problems entering employment.

In most countries more stringent assessments for disability benefits have only been applied to new benefit claimants,²⁹⁹ however the UK government has gone further, reassessing the entire caseload of people on out-of-work disability benefits. This reassessment process used a new tool developed in the UK for determining whether claimants were able to work, called the Work Capability Assessment (WCA). The WCA consists of a checklist of possible levels of impairment in different activity areas (See Appendix 7.1 for a list of activity areas). The WCA was

³ By out-of-work disability benefits we mean income support benefits that are paid to people who are unable to work due to disability, as opposed those paid to cover the extra costs of disability.

introduced in 2008 for all new claims for out-of-work disability benefits. From 2010 the government initiated a programme to use the WCA to reassess all 1.5 million claimants who had started receiving out-of-work disability benefits prior to 2008. This process was due to be completed in Spring 2014, however around 200,000 people are still awaiting reassessment.³⁰²

The WCA has been subject to 5 independent reviews that have identified concerns about its fairness and effectiveness.¹⁴⁶ Critics of WCAs claim it is inaccurate, as nearly 40% of those initially deemed 'fit-for-work' who appeal have decisions overturned.³⁶⁵ In particular the reviews indicate that the WCA does not accurately reflect the full impact of mental health conditions on the claimant's capability for work.³⁶⁵ The assessment procedure has also been criticized for being impersonal and mechanistic, with a lack of communication between the various parties involved contributing to poor decision making.^{146,365,366} As a result of the independent reviews, however, the WCA has changed over time, including changes to the capabilities assessed, the organisation of the assessment and the appeals process.³⁰³

It is possible that the reassessment process could increase the employment prospects of people with longstanding health problems by identifying those who are able to work and requiring them to engage in activities to prepare for and find work. Also, moving people assessed as fit-for-work onto unemployment benefits, which are less generous than disability benefits, could incentivize people to find work. A survey carried out by the Department for Work and Pensions, found that 18% of those undergoing a WCA were in work 12 months later³⁶⁷ and a recent study from Austria found that the introduction of stricter assessment criteria for disability benefits increased employment.³⁶⁸ There are reasons, however, to think that the reassessment process might have a limited impact on employment, given that people receiving disability benefits in the UK are concentrated in areas where

unemployment is high and demand for labour is weak.^{360,361} People assessed as ineligible for disability benefits still have major barriers to employment, with studies reporting that the employment prospects of older rejected applicants are not much better than those assessed as eligible for these benefits.^{130,131,369} We conducted a systematic review of studies investigating the employment effects of stricter assessment criteria for out-of-work disability benefits finding that this tended to shift people from disability benefits onto other benefits (e.g. unemployment benefits) rather than moving people into employment.²⁴² We do not know whether the current reassessment policy in the UK has enabled more people with longstanding health problems to enter employment or not.

We have previously shown that the reassessment process was associated with a marked deterioration in a number of indicators of population mental health.³⁷⁰ In the study presented here we sought to determine whether the reassessment policy had a positive impact on employment by using the fact that different parts of the country were affected to varying degrees by this policy. Specifically, we investigate whether people out-of-work with longstanding health problems experienced a greater increase in the chances of moving into employment in local authority areas where a greater proportion of the population had been through the reassessment process.

8.4 Methods

Data

We used two main datasets for this study. Firstly aggregate quarterly data on the cumulative number of people undergoing reassessment in each of 149 upper tier local authorities in England, between 2010 (the beginning of the reassessment programme) and 2013 were obtained from the Department of Work and Pensions. Secondly we used the Quarterly Labour Force Survey (QLFS), which consists of a rolling panel with each household included for 5 consecutive quarters.¹⁹¹ The first wave of the QLFS is face-to-face while waves 2-5 are by telephone. Aggregate local

authority data on the reassessment programme were linked to the survey data using indicators of the local authority area in which respondents lived. We included all out-of-work respondents aged between 18 and 64 in England who had responded in at least 2 consecutive quarterly surveys between 2010 quarter 1 to 2013 quarter 1. The City of London, Rutland and the Isles of Scilly were excluded due to the small sample sizes in these areas. We included proxy responses in the main analysis and conducted additional sensitivity analysis excluding these (see Appendix 7.4). We did not include data from beyond 2013 quarter 1 because the question indicating longstanding health problem changed at this point, resulting in a discontinuity in the data series. We excluded respondents who were in full time education and those with missing data (2%) giving a sample of 102,927 responses from 60,506 individuals (see Appendix 7.5 for summary statistics).

Exposure and outcome variables

Our exposure variable, the reassessment rate, was the cumulative proportion of the working age population in each local authority area who had been through the reassessment process, by the end of each quarter.³⁰² Our outcome variables were the probability that respondents in the QLFS moved into employment or moved between inactivity and unemployment. We used International Labour Organisation definitions²⁷⁹ for unemployment - being out of work, but available and actively seeking employment, and inactivity - being out of work and not available or actively seeking employment, i.e not in the labour force.

Control variables.

From the QLFS we used variables indicating, age, sex, presence of a longstanding health problem, main health condition, years of education, and number of quarters since last employment, to control for individual confounders. Health status was grouped into three categories based on the respondent's main health problem: 1) those with no longstanding health problem, 2) those whose main condition was a

mental health problem and 3) those whose main condition was a physical health problem.(details of survey questions used are given in Appendix 7.9.) People whose main condition was physical could have a secondary mental health problem and vice versa, however, we classified these groups based on their main health condition, as this is likely to be the basis on which they would claim disability benefits.

Two educational groups were defined, those who left full time education before the age of 17 and those who continued in full time education after this point. Time out of employment was taken as the number of quarters since last employment or for those individuals with no previous employment the number of quarters since they were aged 18.

We have shown previously that the pattern of the reassessment process followed differential regional trends.³⁷⁰ The North East, North West, and more deprived areas were affected to a greater extent as the programme targeted areas with higher levels of people on out-of-work disability benefits. We therefore included controls at the local authority level for area deprivation using the Indices of Multiple Deprivation (IMD2010)³⁰⁵, the proportion of the working age population in each local authority receiving out-of-work disability benefits in 2010,¹⁹⁷ Government Office Region and annual Gross Value Added (GVA) per head of population (the regional equivalent to GDP).^{197,306}

Analysis

Initially we plotted the quarterly probability that QLFS respondents out-of-work with and without a longstanding health problem entered employment each quarter from the first quarter of 2004 to the first quarter of 2013, adjusted for age using the European Standard population. We then used a complementary log-log model to investigate whether increases in the reassessment rate in each local authority area between 2010 and 2013 were associated with increases in transitions into

employment amongst respondents resident in the same areas during this time period. This model provides a discrete time equivalent to a continuous time proportional hazards model^{199,371} (see Appendix 7.3 for further detail). We investigated whether this association varied depending on whether their main health problem was mental or physical or they had no longstanding health problem, by including an interaction term between the health status variable and the reassessment rate.

To investigate whether increases in the reassessment rate in an area were associated with increases in other labour market transitions we used a multinomial logit model, that additionally allows for the estimation of transitions into multiple destinations.³⁷¹ For those unemployed we estimated the association between the reassessment rate in an area and the transitions into either employment or inactivity, and for the inactive we estimated the association with transitions into either unemployment or employment. We included the same control variables as above in these models.

We estimated all the regression models combining data on men and women as well as running the analysis separately for men and women. All analysis included survey weights to adjust for response bias and was carried out in STATA version 14.

Robustness tests.

To investigate the sensitivity of our analysis to detect an effect given different sizes of policy impact, we used simulations to estimate the power of the analysis for a range of plausible effect sizes (see Appendix 7.7). The analysis had a 75% power to detect a hazard ratio of 1.1 at the 5% level. We analysed the level of attrition from the QLFS panel and whether this was associated with the reassessment rate and we conducted analysis adjusting for this attrition using inverse probability weights calculated using methods outlined by Jones et al³⁷² (see Appendix 7.4 for further detail). We investigated the geographical pattern of the variation in the

reassessment rate that was not explained by our control variables; to investigate whether the remaining pattern of variation indicated any other obvious sources of bias (see Appendix 7.6).

We repeated the analysis using the fit-for-work rate (the cumulative proportion of the working age population in each local authority area that had been found fit-for-work through the reassessment process), rather than the reassessment rate, as the former may be a more specific indicator of the employment effects of the policy. As it is possible that there was some delay between people being reassessed and subsequently moving into employment, we replicated the models outlined above with the reassessment rate lagged by 4 quarters (i.e a year). A one year lag was considered appropriate as it has been reported that a relatively large proportion of claimants are in work 1 year after their assessment.³⁶⁷ We also conducted additional analyses, excluding proxy responses, adjusting for interview mode, controlling for three categories of educational level and adjusting for pre-existing trends in employment transitions by educational group (see Appendix 7.4 for alternative analyses).

To test whether our estimates from the QLFS of the effect of the policy on transitions into unemployment could be replicated in alternative datasets we use a fixed effect regression model to analyse whether local trends in the reassessment rate were associated with local trends in the quarterly unemployment benefit claimant rate in each local authority. (see Appendix 7.4 for further details).

8.5 Results

By the end of March 2013, 823,360 people, 2.4% of the working age population had been through the reassessment process (66% of existing claimants). The proportion varied across the country from 0.7% in Wokingham (51% of existing claimants) to Knowsley where 5.4% of the working age population (69% of existing claimants) had experienced a reassessment by March 2013. 191,430 of the total number

reassessed (23%) were judged to be fit-for-work (adjusted for all completed appeals).

Figure 22 shows the trend in transitions into employment before and during the reassessment process, for people with and without a longstanding health problem (see Appendix 7.2 for breakdown by type of health problem). People with a longstanding health problem had a markedly lower chance of entering employment over this period and this pattern remains relatively stable over time.

Figure 22. The percentage of working age people (18-64) with and without a longstanding health problem entering employment each quarter, from the second quarter of 2004 to the first quarter of 2013.

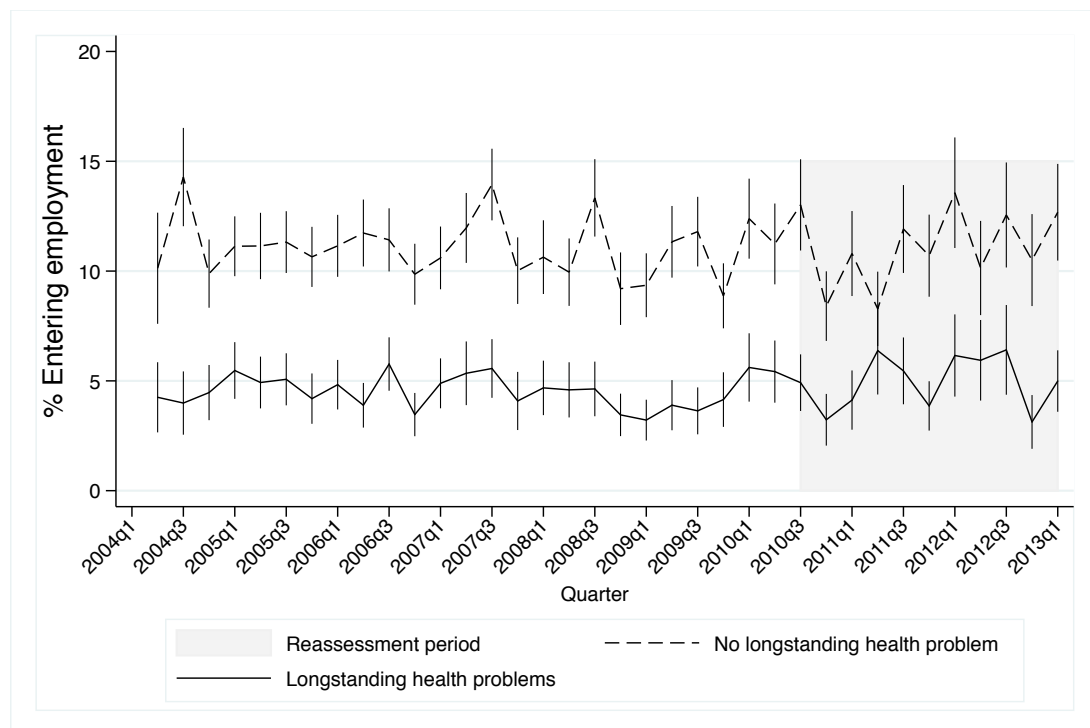
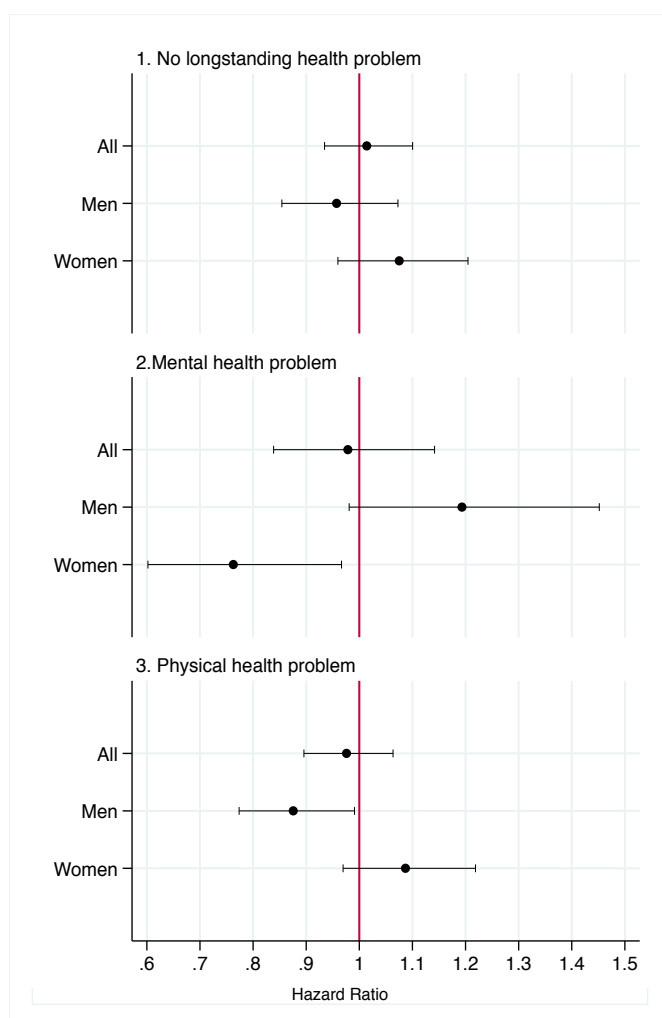


Figure 23 shows results from the complementary log-log model indicating the association between the reassessment rate in an area and the chances that people out-of-work entered employment.

Figure 23. Hazard Ratios (HR) for men, women and combined, indicating the change in the probability that people out-of-work entered employment for each additional 1% of the working age population experiencing reassessment in the area. Models based on formulae shown in Appendix 7.3 and control for age, sex, regional GVA, government office region, education, time since last employment, baseline disability benefit receipt, area deprivation, season and year.

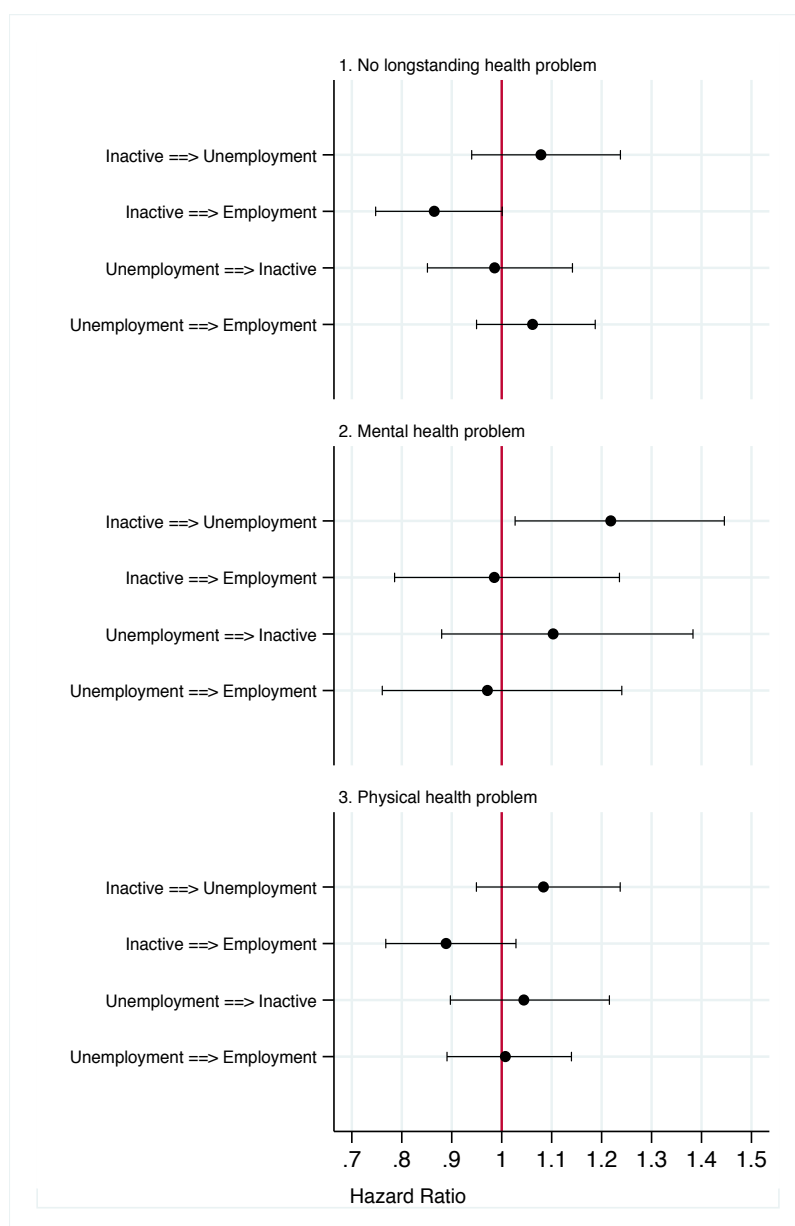


In analysis pooling responses from men and women, the reassessment process was not associated with an increase in people with a physical (HR 0.98, 95%CI: 0.89 to 1.06, $p=0.6$) or mental (HR 0.98, 95%CI: 0.84 to 1.14, $p=0.8$) longstanding health problem entering employment. There were, however, some difference in effects by gender. The reassessment process was associated with a significant *decrease* in the chances that women with a mental health problem entered

employment (HR 0.76, 95%CI: 0.60 to 0.97, $p=0.03$) and a significant decrease in the chances that men with physical health problems entered employment (HR 0.88, 95%CI: 0.77 to 0.99, $p=0.04$). In contrast, the reassessment process was associated with an increase in the chances that men with mental health problems (HR 1.19, 95%CI: 0.98 to 1.45, $p=0.08$) and women with physical health problems entered employment (HR 1.09, 95%CI: 0.97 to 1.22, $p=0.15$), although these effects were not significant at the 5% level.

The results from the multinomial logit regressions are also shown in Figure 24 indicating the association between the reassessment rate in an area and transitions between unemployment, inactivity and employment. The reassessment process was associated with an increase in the chances that people with a mental health problem moved from inactivity into unemployment. For each 1% of the working age population who experienced reassessment in an area, the probability that inactive people with a mental health problems entered unemployment increased by 22% (HR = 1.22, 95% CI 1.03 to 1.45, $p=0.02$). (see Appendix 7.8 for further analysis)

Figure 24. Hazard Ratios (HR) indicating the change in risk of transition between inactivity, unemployment and employment associated with each 1% of the working age population experiencing reassessment in the area. Responses from men and women combined.



We found similar results to our main analysis, when using the lagged, rather than contemporary reassessment rate, when we excluded proxy responses, used alternative controls for education, controlled for interview mode, controlled for pre-existing differential time trends by educational group and when using the fit-for-work rate rather than the reassessment rate (see Appendix 7.4). We investigated the factors associated with attrition from the panel and found that the reassessment

process was not associated with attrition indicating this was unlikely to bias our results. When using inverse probability weights to adjust for attrition we found similar results.

The fixed effects regression analysis of the association between trends in the reassessment rate in each local authority area and trends in unemployment benefit receipt indicated that each additional 100 people experiencing reassessment in an area was associated with an additional 26 people claiming unemployment benefits [95% CI: 21 to 31, $p < 0.001$] (see Appendix 7.4).

8.6 Conclusion

The programme of reassessing the eligibility of people on disability benefits using the WCA was not associated with increased transitions into employment by people with longstanding health problems. It was associated, however, with more people with a mental health problem moving from being inactive and out of the labour market to being classed as unemployed.

Strengths and limitations

A strength of our analysis is that we have been able to link an area-based measure reflecting the intensity of exposure to a policy in each local authority to a large longitudinal survey of people living in those areas. This has allowed for individual and area based confounders to be controlled for in the analysis. The results also remained similar across a number of different specifications and datasets. The findings are also consistent with evidence from our previous systematic review indicating that similar policies did not markedly increase employment.[22]

Some limitations remain. Firstly the effect of the reassessment policy on employment may have been too small for our study to detect. Investigation of the statistical power of the analysis indicates that we would have had a reasonable chance of identifying an effect if the policy had resulted in 10% to 20% of those

reassessed entering employment. If reassessment process had a smaller impact on employment it is quite likely that we would not have detected an effect (see Appendix 7.7).

Secondly it is plausible that the effect of the policy on employment occurs more than a year after the reassessment process, and we were not able to detect these delayed effects. Thirdly we do not have individual level data on the people undergoing reassessment and so used area-based associations. We therefore cannot be certain whether these associations reflect changes at an individual level. For example it is possible that people moved into employment due to the reassessment process but that this adversely affected the job prospects of other people with longstanding health problem in the same locality who had not been through the reassessment process. Fourthly it is possible that the association between the reassessment process and employment outcomes was obscured by unobserved confounding factors. When investigating the variation in the reassessment rate that was not explained by the control variables we found there was no obvious spatial pattern that might indicate missing confounding variables (see Appendix 7.6).

Our finding that the effect of the policy on transitions into unemployment was greatest for people with mental health problems, needs to be interpreted with some caution. Although this result was significant at the 5% level, it was not the primary hypothesis we planned to investigate. This finding, however, is highly plausible given that most previous research has found that similar policies shift people onto unemployment benefits.^{242,368} We also found that the reassessment process was associated with an increase in the number of people receiving unemployment benefits and previous reports have found that people with mental health problems were more likely to be assessed as fit-for-work, and therefore more likely to be moved off disability benefits and onto unemployment benefits.^{64,373}

Policy implications

Our results have important implications for policy. The WCA and the associated reassessment process were introduced to increase the employment of people with disabilities and longstanding health problems. However we have found no evidence that the policy had a substantial impact on their chances of moving into employment and some indication that it might have had a negative impact for some groups. We have previously shown that the reassessment policy was associated with an increase in a number of adverse mental health outcomes, including a large increase in suicides.³⁷⁰ The observational evidence presented here and our previous paper suggests that the harms of the reassessment process may outweigh the potential benefits. These findings are likely to be generalizable to other countries with similar socioeconomic conditions and welfare systems. Those countries considering similar policies should carefully develop and evaluate alternative approaches that reduce potential adverse health effects whilst effectively supporting people into employment.

It is possible that the policy did not improve the employment prospects of those assessed because they continued to experience significant barriers to employment, or there was insufficient demand in the local labour market. The widely accepted social model of disability³⁰¹ indicates that whether a person with a given level of impairment is able to work will depend on a number of factors unrelated to their impairment, including workplace conditions, access to education and skills and local labour market conditions.³⁰¹ An important issue for policy makers is whether these factors should be taken into account when assessing disability. A recent report has shown that the UK is relatively unusual in not taking into account these social factors when assessing disability.³⁰¹ Our finding that being assessed as fit-for-work using the WCA does not markedly improve people's employment chances, indicates

that a fairer assessment may need to take into account these social factors if it is to reflect a person's actual chances of finding work.

Our study found that the reassessment process was associated with a reduction in the employment prospects of women with mental health problems and men with physical health problems, and an increase in the employment prospects of men with mental health problems and women with physical health problems. The reasons for this pattern are unclear, however, this finding highlights the importance of taking into account the differential effects of disability assessments when designing approaches that work for all groups.

The movement of people with mental health problems onto unemployment benefits, indicated by our study, has implications for the support that is provided to them and their health and wellbeing. Firstly people with mental health problems may find it harder to meet the tougher rules that claimants of unemployment benefits are required to follow or risk losing their benefits. There have already been reports of increasing numbers of unemployed people with mental health problems having their benefits stopped because they were not able to comply with these stricter conditions.³⁷⁴ There is evidence that these 'sanctions' are putting them at risk of severe poverty.^{287,288} Secondly mental health-related barriers to employment are unlikely to be adequately addressed through return-to-work programmes targeted at the unemployed.²⁹⁹ There is an urgent need to develop better services that support the increasing numbers of people with mental health problems receiving unemployment benefits.

Governments are facing increasing pressure to reduce expenditure on disability benefits by moving claimants off benefits and into work. Improving the employment of people with longstanding health problems and disabilities could help reduce the risk of poverty in this group and contribute to reducing health inequalities. We found no evidence, however that the policy of reassessing the eligibility of existing

claimants using a tougher functional checklist was effective at achieving this aim. This policy could have unintended adverse consequences, by moving people with mental health problems onto unemployment benefits, where they receive insufficient support and are subject to a punitive sanctioning policy which has severe consequences for their health and risk of poverty.

What is already known on this subject?

- Since 2010 over a million claimants of the main out-of-work disability benefit in the UK had their eligibility reassessed using a new Work Capability Assessment (WCA), as part of the government's strategy to promote the employment of people with longstanding health problems.
- We do not know whether the policy led to more people out-of-work with longstanding health problems entering employment.
- No previous studies have investigated the impact of this policy on the employment of people with longstanding health problems.

What this study adds.

- The policy was not associated with increased transitions into employment by people with longstanding health problems.
- It was associated, however, with more people with a mental health problem moving from being inactive and out of the labour market to being classed as unemployed.
- Policies using assessments such as the WCA to reassess the eligibility of disability benefit claimants may have little or no effect on the employment of people with longstanding health problems.
- Increased support is needed for people with mental health problems who were moved onto unemployment benefits as result of this policy.

Competing Interests

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

Transparency declaration.

The lead author affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained.

Data sharing. Statistical code is available from corresponding author. The data is available under Office for National Statistics Special License Access from the UK Data Archive.

Ethics.

Ethics approval was not required.

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anticipates the commission's future policy in this area. RL is supported by a Welcome Trust grant.

9 Chapter 9: Discussion and conclusion

9.1 Summary of results.

The 5 empirical studies included in this thesis address a number of questions relevant to our understanding of the effects of recession and welfare policy on mental health problems and the employment of people with health problems. Study 1 highlights methodological challenges and developments.

In Study 2, I found that the recession reversed the previous declining trend in suicides. This was explained in part by increases in unemployment, with those areas experiencing the highest increases in unemployment experiencing the largest rises in male suicides. We know from other research that the relationship between male suicides and unemployment is weaker in countries with more generous welfare systems.³⁷⁵ I also found in additional analysis (see Appendix 3.6) that in England the unemployment - suicide association was much higher in the 2008 recession than in the previous 1990s recession when unemployment benefits were more generous, less conditional and covered a greater proportion of the unemployed population. This suggests that changes to welfare systems in recent decades may have reduced the extent that unemployment benefits mitigate the mental health effects of unemployment during recessions.

From the analysis in Study 2, the expectation was that suicides would follow the trend in unemployment, levelling off between 2010 and 2012 and declining in 2013. This expectation was not borne out by the analysis in Study 3, which showed that suicides actually continued to increase from 2010 to 2013. Study 3 shows that the prevalence of reported mental health problems also increased rapidly from 2009 into 2013 rising most in the more disadvantaged groups, widening inequalities. The increase in mental health problems from 2009 broadly mirrored the increase in suicides and antidepressant prescribing and was only partly explained by trends in unemployment and wages. I hypothesised that welfare reforms or other austerity

measures could have contributed to this rise in mental health problems. The combined result of the rise in the prevalence of mental health problems and the increase in inequalities was an increase in the proportion of the working age population experiencing the multiple disadvantages of being out of work, having a mental health problem and low levels of education.

In Study 4 I investigated the hypotheses generated in Study 3, with respect to one particular welfare reform –the reassessment programme, that applied a more stringent assessment procedure (the Work Capability Assessment) to existing claimants of disability benefits. I found this reassessment programme was associated with adverse trends in suicides, self reported mental health problems and prescribing of antidepressants, and that this contributed to the widening of inequalities in mental health problems, and explained much of the increase in mental health problems since 2010 observed in Study 3.

In studies 5 and 6 I investigate the employment effects of this and similar policies. Study 5 outlined a systematic review finding that policies restricting eligibility for disability benefits tended to just move people from disability benefits onto unemployment benefits, and there was little evidence indicating that they increased employment. There was some evidence however that reducing the adequacy of benefits did have a small positive impact on employment.

In Study 6 I found similar results to those reported in the systematic review (Study 5). The reassessment programme did not lead to more people entering employment, but it did increase the chances that people with mental health problems, moved from being out of the labour market into unemployment.

Overall, the six studies suggest that because of changes to the welfare benefit system, the mental health impact of the recession may have been worse than it needed to be. Welfare benefit reforms since the recession have then further exacerbated this situation, having direct negative consequences for mental health,

whilst not improving employment chances. The combine effect of these policies has been an increase in people out-of-work with mental health problems. Improving the wellbeing and social inclusion of this group is likely to present an even greater challenge for future welfare policies.

9.2 Strengths and Limitations.

There are a number of strengths and limitations to the approaches used in this thesis. All of the studies used routinely available population-wide datasets. These datasets have the advantage of covering the whole population, being available without additional cost, and providing the opportunity for comparisons between exposures and multiple outcomes across multiple areas and time periods in different datasets. There are however a number of drawbacks relating to the quality of the data and limitations in the measurements and time periods that were available.³⁷⁶

There were only three indicators of mental health problems - suicides, antidepressant prescribing and self-reported mental health problems - that were available in datasets that covered the whole country over a number of years, with sufficient precision to compare differences between local authority areas. These only capture a small proportion of the overall burden of mental health and this will depend on access to and use of health care, stigma, propensity to report mental health problems in surveys and the use of narrative verdicts by Coroners. As discussed in Chapter 2, it is likely that these factors would have tended to follow long term secular trends, therefore as the regression models in this thesis all adjusted for long term time trends, this will have reduced the risk of bias from these sources. The high level of correlation between local trends in these indicators also suggests that at least in part they reflect common trends in population mental health as discussed in Chapter 2.

Most of these datasets were only available as aggregate data at the local authority level. There is a risk of ecological fallacies in this type of analysis, where ecological

(aggregate) level associations do not properly reflect individual-level associations.³⁷⁵

These ecological biases occur when variables at the group level acts as either confounders or modifiers.³⁷⁵ Greenland and Morgenstern (1999) have shown that variables at the group level can act as confounders even if they are not confounders at the individual level, when there is an association between group exposure level and disease in the unexposed conditional on the group level controls.³⁷⁵ There is less of a risk of this source of ecological bias in the longitudinal ecological analyses used in this thesis compared to a simple cross-sectional study design. This is because for ecological confounding to occur there would need to be a correlation between the *change* in group mean exposure and the *change* in the rate of disease in the unexposed population within each group, rather than just between the level of group mean exposure and the rate of disease in the unexposed population.³⁷⁷ Its important to note, however, that confounding associations in longitudinal ecological analysis can also result from changes in the composition of group populations and well as changes in individual risks.

Ecological bias due to effect modification occurs where there is an interaction between group level exposure (or another group variable correlated with exposure) and individual level exposure.³⁷⁵ For example in Durkheim's famous study, the finding that there was an association between regional levels of Protestantism and regional suicide rates could be explained by Catholics having higher suicide rates when living in predominately protestant regions. In other words if there was an interaction between the individual effect of being Catholic and the regional level of Protestantism this would lead to ecological bias due to effect modification.

So in the context study 2 of this thesis ecological bias due to confounding could occur if change in the average of an unmeasured risk factor for suicide, in a local area, was associated with change in the local unemployment rate. Reviews indicate that risk and protective factors for suicide include mental illness, substance misuse,

personality traits, pregnancy, poverty, social support, religious participation, access to treatment and access to means to take one's own life.³⁷⁸ Clearly many of these risk factors could be in the causal pathway between recession / unemployment and suicide risk as outlined in chapter 2 (e.g mental illness, poverty and social support) and local unemployment rates may reflect wider economic impacts of recession and not just unemployment per se. Other factors such as local trends in personality traits, religious participation, access to treatments, access to means to take one's own life could induce an ecological association even if they are not confounders at an individual level if variation in local area trends in these factors was associated with local trends in unemployment. Whilst there are no particular reasons to think that this would be the case the possibility cannot be excluded. Similarly in Study 4 trends in these factors would lead to bias if associated with local trends in the reassessment rate.

Ecological bias due to effect modification could occur in Study 2 if there was an interaction between trends in local area unemployment rates and the effect of employment or unemployment on health. For example if the risk of suicide increased amongst people in work during times of higher unemployment. This is quite plausible as increased unemployment could lead to increased work related stress and fear of job loss.³⁷⁵ This further supports the use of local unemployment rates as an indicator of the wider effects of recession within an area, rather than as just reflecting the direct effect of unemployment. Similarly ecological bias due to effect modification could occur in Studies 4 and 6 if the mental health and/or employment prospects of people who *did not* go through the assessment process deteriorated more in areas where more people underwent reassessment. This would include effects of the reassessment process on the families and carers of people undergoing assessment, and potential economic effects through loss of resources from the wider community. Whilst the ecological nature of the analyses,

limits the conclusions that can be drawn about mechanisms operating at the individual level, by capturing wider impacts beyond the individuals directly affected these approaches may be more relevant for evaluating the population level impact of policies.³⁷⁹ This approach of using longitudinal aggregate data to investigate the impact at a population level of policies that are targeted at population subgroups has been relatively common in studies investigating the impact of disability benefit policies on employment. Many of the studies included in the systematic review in Study 5 used this approach.^{348,380–382} For example the two studies by Campolieti^{380,381} use aggregate provincial level data to investigate the impact of changes to the disability component of the Canadian Pension Plan on the overall labour market participation of older men and women. The study by Autor and Duggan (2003) in the US also used aggregate longitudinal state level data to investigate the impact of changes to disability insurance programme on the overall employment of older men.¹

As with any observational studies, there is potential for confounding due to the omission of unmeasured variables. One of the strengths of the analysis in this thesis has been the use of econometric methods for adjusting for time-invariant unmeasured confounding factors (e.g differencing and fixed effects). The datasets have also provided the opportunity to use Non-equivalent Dependant Variables (NDV) to test the specificity of the analysis to outcomes that we would expect to be influenced by exposure. It is not possible, however, to eliminate the possibility that the results are due to trends in some other unobserved factors, which could not be accounted for in the analyses. The validity of the results needs to be assessed in the context of previous evidence and theoretical evidence for plausible mechanisms through which recession and welfare reforms are likely to influence mental health and employment. As I highlighted in Chapter 2 there is strong empirical and theoretical evidence indicating that unemployment and recession adversely effect

mental health. The systematic review outlined in Study 4 indicates that there was some prior evidence that restricting eligibility to disability benefits does not increase employment. Other recent analysis of trends in benefit receipt and employment, also do not suggest that recent welfare reforms were associated with increased employment.^{383,384}

Whilst there is limited prior empirical evidence to indicate whether the reassessment process was likely to adversely effect mental health, the theoretical evidence outlined in the introduction, suggests mechanisms through which it could have had an effect. The people undergoing reassessment were a particularly vulnerable group, they had pre-existing health problems, particularly mental health problems, and the majority had been out of work and receiving disability benefits for at least 5 years before having their entitlement to these benefits reassessed.²⁹¹ We know that the onset of common mental health problems is generally the result of both pre-existing vulnerabilities and contemporary triggers.⁷³ The harms of the reassessment programme could have occurred at any step in the reassessment process. It is likely that the process started affecting people from the point they heard that they were going to be reassessed. The anticipation of the impending reassessment and associated uncertainty could be extremely stressful. As a recent qualitative study has shown, fears about the potential impact of welfare changes can trigger self-harm, in addition to the actual changes in benefits.³⁸⁵ The assessment process is frequently described as dehumanising and degrading by the people who have been through it, who say they feel criminalized, judged, not respected as an individual, and powerless.³⁸⁶ The assessment process itself, therefore, could trigger mental health problems, particularly in people with pre-existing vulnerabilities. Many people then appealed the assessment decision and underwent a lengthy and stressful appeals process, which could harm their mental health. For those who were moved off disability benefits the loss of income is likely to adversely affect mental health.

^{103,385} Most of those who were moved off disability benefits through this process then claimed Job Seeker Allowance , where the experience of having to meet increased conditions or risk loosing benefits altogether could further adversely affect mental health.³⁸⁷ The associations demonstrated in study 4 are therefore entirely plausible as well as being consistent with anecdotal reports from surveys of claimants, doctors, public inquiries and Coroners' inquests.^{147,292,298} We cannot know from study 4, which aspect of the procedure led to adverse mental health outcomes. Further research is needed to identify these in order to develop approaches that reduce the potential for harm.

9.3 Political perspectives on welfare reform.

The evidence from the studies presented in this thesis need to be understood within the context of different political perspectives about the role of welfare benefits and the need for reforms. The role of welfare benefits from the inception of the welfare state have been to prevent poverty, ensure a minimum standard of living and promote social solidarity.³³ As outlined in Chapter 2, however, since the 1980s policy makers from across political parties in the UK have emphasised the negative impacts of welfare benefits and implemented reforms to try and address these. This perspective has principally focused on three arguments, firstly that welfare benefits act as disincentives for work, secondly that current levels of expenditure on welfare benefits cannot be sustained and thirdly that receipt of cash benefits harms the recipients and society in general by encouraging undesirable behaviours. The different political perspectives on welfare tend to largely differ in their emphasis, rather than in their content. Those on the left tend to emphasise how higher welfare benefits help to reduce inequality and reduce poverty whilst those on the right emphasise how welfare benefits create disincentives to work and increase government expenditure, leading to higher taxes which have economic costs for society. There are also differences in the way welfare recipients are portrayed. Early

proponents of the welfare state emphasised the importance of social rights based on citizenship. The receipt of income maintenance through welfare benefits was seen as an entitlement and an expression of these rights.^{388,389} Increasingly, however, researchers and policy makers from the left and the right have emphasised the 'undesirable' behaviours and attitudes of welfare recipients (e.g single parenthood, low work ethic, ant-social behaviour)^{40,390} and have promoted the use of the welfare system to encourage positive behavioural responses. This has led to a greater emphasis on active programmes to enable recipients to enter employment, as well as an increase in conditionality, punitive measures, stricter assessments and narrower eligibility criteria. Critics of this 'new paternalism' have argued that it is not actually designed to help the poor but rather to present welfare as a program for the 'underserving poor', which in turn will make welfare retrenchment more politically attractive.⁴⁵

Whilst it is not within the scope of this thesis to critique or review the empirical evidence for these different perspectives, the studies in this thesis provide insights into some aspects of these arguments. Firstly the systematic review presented in Study 5 supported the argument that increased disability benefit levels can act as disincentives, increasing the numbers of people receiving benefits. These effects were, however, generally small in the most robust studies and these studies tended to focus on increases rather than decreases in benefit level. They were also based in Scandinavian countries with relatively generous benefit levels and may not apply in countries with less adequate benefits. The current government policy to substantially reduce disability benefit payments from an already low baseline may not have the same employment effects as predicted in these studies.

Studies 6 and 7 did not support the argument that stricter assessment criteria encourage more people with disabilities to enter employment. Rather the evidence suggested that these policies tended to move people between different welfare

benefits rather than into work. Researchers and policymakers from the right and the left have argued for the simplification of the benefits system to reduce the extent to which people shift between benefits as procedures change.³⁹¹ This is one of the arguments behind the introduction of Universal Credit in the UK, which combines several welfare benefit programmes into one. Others have gone as far as to suggest replacing all welfare benefits with a guaranteed basic income for all citizens. This is an idea that has supporters from the left and the right, it was endorsed by Friedrich Hayek¹, often seen as the father of Neo-liberalism, and is being considered by the current leadership of the Labour party in the UK.²

Study 4 highlighted an issue that has been given little consideration by researchers or policymakers whatever their political persuasion. Specifically whether the procedures of welfare benefit receipt can in themselves harm recipients. Whilst there are researchers and policy makers who have argued that welfare benefit receipt harms the health and wellbeing of recipients^{39,40,390} there has been little investigation into the health effects of the procedures that recipients need to undergo in applying for and receiving welfare benefits. The findings of study 4 could have implications for arguments for welfare reforms from both a right or left wing perspective. Some on the left argue that assessments for disability benefits need to take a more social approach taking into account the conditions in which a disabled person lives not just a narrow set of functions.³⁰¹ It could be argued that this approach would be less harmful to the people undergoing assessment. Similarly one could argue that the privatisation and outsourcing of welfare and disability assessment procedures has contributed to their potential for harm. Disability assessors are reported to be working under increasing pressure, with little job security, to rapidly process claims to meet contract targets³⁹³ These conditions may not be supportive of an assessment process where there is respect and understanding between assessor and claimant. There are however many on the

right who are suspicious of the state's bureaucratic procedures for means testing and needs assessment, as these are seen as forms of state intrusion into peoples personal lives.³⁹⁴ The harms that appear to have resulted from the Work Capability Assessment could support these arguments. One of the arguments from those on the right for a Universal Basic Income is that it would remove the need for these assessment procedures.³⁹⁴

The findings of these studies can be therefore be interpreted from different political perspectives and provide evidence that can support and influence arguments from both right and left wing political perspectives. The evidence however does have implications for developing welfare systems that mitigate the negative consequences of job loss, help people into work and do not harm the people they aim to help.

9.4 Implications for Policy.

The health impact of welfare benefit policies has been under recognized and under researched. Whilst successive governments over recent decades have focused on welfare reform, policy makers have not taken into account the health impact of these reforms when deciding between alternatives. Benefit policies could have health effects, due to changes in the adequacy of benefit levels, changes in conditionality, changes in assessment procedures, and through the impact of these changes on employment transitions. The central focus of this thesis has been to investigate some of these pathways. The studies have shown how unemployment benefits appears to offer less protection against the mental health effects of recession than they used to, how changes to the assessment procedures for disability benefits can have severe mental health consequences and how restricting access to disability benefits does not appear to improve the employment chances of people with health problems. This evidence indicates that current welfare reforms are having a negative impact on mental health and widening inequalities and it provides some

indication of the welfare policies that are likely to promote health and reduce health inequalities.

Firstly, reforms need to increase incentives for work by increasing the income people receive from work, rather than reducing the adequacy of welfare benefits. Current changes to the level of welfare benefits are being justified on the basis that they will improve financial work incentives. As I have shown in Study 4 it is likely that reducing the adequacy of disability benefits will have a small but positive impact on employment. But it is also likely that, as this policy will result in a reduction in the income of people who do not enter employment, this will have a negative effect on their health.¹⁰³ Also reducing the adequacy of out-of-work benefits may increase the adverse health effects of job loss. Therefore even if reducing the adequacy of benefits resulted in some people entering good employment that improved their health, it is likely that overall this policy would have a negative health effect. The studies outlined in Study 4 highlighted that the incentive effects of wages were stronger than the financial disincentives of disability benefits. Therefore it would be expected that an increase in wages, for example through the introduction of a living wage, would result in more people moving off benefits and into work, than a similar cut in benefits. It is likely that this increase in wages would also have additional health benefits for people already in work.¹⁰³ There have been increasing calls for the introduction of a living wage, with several local authorities and other organisations implementing and campaigning for this.³⁹⁵ The recent report of the Living Wage Commission has concluded that bringing an additional 1 million workers up to the living wage is achievable by 2020.³⁹⁶ In July 2015, the Chancellor announced the introduction of a National Living Wage, however this was lower than the level proposed by the Living Wage Commission and was largely offset by reductions to existing in-work benefits.²⁸³

Secondly, the adequacy of benefits should be set at a level that ensures health is

not adversely affected. The Minimum Income for Healthy Living provides an evidenced-based systematic approach to setting welfare benefit levels so that they effectively counteract poverty, improve living standards and reduce health inequalities.³⁹⁷ It is based on the level of income that enables consumption of a healthy diet, expenses related to exercise costs, as well as costs related to social integration and support networks.^{313,398} Current benefits are well below this level and the review of health inequalities in England by Michael Marmot³⁹⁸ has recommended that a Minimum Income for Healthy Living is developed and implemented. An important consideration in using a Minimum Income for Healthy Living to set benefit levels should be the mental health effects of different welfare benefit levels.

Thirdly the assessment processes for out-of-work disability benefits need to be reviewed to develop a system that does not adversely affect the health of claimants. The evidence from this research indicating that the reassessment process may have had severe consequences for mental health is very concerning. Similar ethical standards should be applied to the development of new disability benefit assessment procedures as would be applied to the development of a new medical screening tool. This should include a robust evaluation of the potential harms and benefits of alternatives before widespread implementation. The psychological impact of any future assessment process must be thoroughly assessed through a well-designed trial, with measures taken to reduce the adverse mental health effects of assessment, particularly for more vulnerable groups.

Fourthly, eligibility for disability benefits needs to realistically reflect the opportunity that people have of actually entering employment. Debates about the nature of disability over a number of decades have recognized that it is not simply a set of objectively measured impairments, but depends on the way society is organized and the restrictions this places on disabled people.³⁰¹ Whether a given level of

impairment results in disability will depend on a number of factors unrelated to impairment, including workplace conditions, education and skills and the local labour market. The UK is relatively unusual in not taking into account these social factors when assessing eligibility for disability benefits. A fairer approach would be to develop a “real world” assessment that considers functional impairments alongside social factors that make it easier or harder for different people to work.³⁰¹

Finally, the development of active labour market programmes for both the unemployed and people out-of-work due to disability need to be evidence based. Multi-component disability management programmes that address health related barriers to employment alongside vocational training are likely to be a more effective way of helping people with disabilities into work, than reducing access to disability benefits.^{141–143,362} It is important that welfare benefit policies do not undermine levels of trust between clients and case managers in these schemes as this is likely to reduce their effectiveness.⁵³ Active labour market programmes should not, however, just be assessed against employment outcomes, they also potentially have important health effects.^{9,106,399} Programmes that provide high quality training and enable people to remain socially connected whilst out of work are likely to mitigate some of the adverse mental health effects of unemployment.

9.5 Methodological developments.

The studies in this thesis have contributed a number of methodological developments for the evaluation of the health impact of natural experiments. Firstly I have developed and applied systematic review methods that synthesize evidence from econometric evaluations of natural experiments. Outside of health economics systematic reviews are generally not widely used in economics. In Study 4 I outline a new framework for assessing the validity of these studies within the context of a systemic review (see Appendix 6.3).

Secondly, I have combined the linkage of multiple routine datasets at the local authority level with the application of econometric methods that have not previously been in widespread use in epidemiology. The increasing availability of small area longitudinal routine datasets that include measures of health outcomes and policy exposure, mean that the methods developed in this thesis can be applied rapidly to assess the impacts of policies as they happen. Often the impact of research is enhanced if it can be generated to take advantage of policy windows as they arise.

⁴⁰⁰ For example collaborative work that I have developed alongside this thesis has applied these methods to inform resource allocation policies at a time when they were being revised ^{401,402} and in assessing the impact of cuts in funding for housing services and recent increases in benefit sanctions. ^{288,403}

Welfare benefit policies are complex interventions that present various problems for evaluation. This complexity can result from the multiple mechanisms through which components of the policy influence health and wellbeing. Complexity can also be seen as a property of the context in which the welfare policies operate.⁴⁰⁴ The context will influence whether a particular welfare process is stigmatizing or whether the employment effects of welfare policies promote or harm health. The level of trust in the agencies administering programmes, for example, will influence how stressful these processes are for participants. To know whether a policy is likely to have a particular effect within a particular population, it is necessary to understand how outcomes are generated from the interactions between components of the policy and the specific context in which it was implemented. Qualitative research is needed to describe and analyses the context within which welfare policies work and to investigate the processes and social relationships through which they operate.

One of the conclusions I draw from the studies in this thesis, is that new approaches are needed that combine quantitative and qualitative methods with insights from theory-based approaches to evaluation. I am taking forward the methodological

learning from this thesis through my involvement with the EU funded project - Developing Methodologies to Reduce Inequalities in the Determinants of Health Inequalities (DEMETRIQ). Expertise from that collaboration has contributed to several of the research studies presented in this thesis, and the methodological ideas generated in this thesis have contributed to the development of guidance on evaluating the health inequalities impact of natural policy experiments produced by the DEMETRIQ project. Through an NIHR funded programme of research I am also working with disadvantaged neighbourhoods in the North West, using mixed methods and participative research to gain a more contextual understanding of the impact of economic shocks and local and national welfare policies, in order to improve the role of local government in developing local systems that are resilient to these adverse national and global trends.

9.6 Implications for future research.

The studies in this thesis have highlighted a number of areas requiring further research. The major implication is that the health effects of all major welfare reforms should be assessed and actions taken to modify them to mitigate negative effects. For some reforms such as the development of new assessment procedures, the harms and benefits should be assessed through a well designed trial. In many cases experimental approaches will not be feasible or appropriate, but the availability of linked administrative datasets on welfare benefit receipt, health care utilisation and mortality increases the potential for robust quasi-experimental studies into the health effects of welfare reforms.

As the welfare system in the UK goes through a major process of transformation, there is a need for research that investigates the impact of new policies as they are implemented as well as rapidly assessing the impact of recent policies that are relevant to current policy debates. For example the 1997-2010 labour government experimented with a relatively novel approach to welfare with the introduction of tax

credits and it is recognised that this policy led to a decline in child poverty.⁴⁰⁵

Research is urgently needed to estimate the health effects of this policy and the impact of reversing it, given the current debates about removing these benefits. With colleagues I have developed a research proposal that has successfully received funding from the Wellcome Trust, to investigate this issue.

With the value of a number of welfare benefits being cut through recent government policies more research is needed into the mental and physical health effects of changes in benefit levels and to determine an adequate level for good health. Whilst there is a great deal of research showing that low income has a negative impact on health¹⁰³, there are few studies specifically investigating the health effects of changes in and levels of income from welfare benefits.

The mental health effects of conditionality in the welfare benefit system need to be further assessed and mitigated. It is possible that some of the effects on mental health that we observe in this thesis are due to recent increases in welfare benefit conditionality that reduce the autonomy and control that claimants have over their lives and threaten claimants with sanctions if they do not comply. This trend towards greater conditionality has been associated with increased stigmatization of welfare benefit recipients. Little is known however about how this impacts on the mental health of claimants or the extent that government policies exacerbate or reduces this stigma.

9.7 Conclusion.

It is a statement of the obvious that welfare benefit policies should aim to promote welfare. The success or failure of welfare reform, however, is rarely assessed in terms of its impact on welfare. Health is a key component of most definitions of welfare, however this thesis has found that welfare benefit policies in the UK did not sufficiently mitigate the mental health impact of recession and those policies implemented following the recession have led to a decline in mental health. What is

of particular concern is that this has led to an increase in the numbers of disadvantaged people, out of work with a mental health problem, which may result in greater welfare dependency in the future. Effective welfare reform needs to focus on actions that are likely to promote health by reducing low paid work, ensuring adequate benefit levels, establishing fairer 'real world' disability assessments, and promoting the autonomy and control of welfare recipients. This may not only be a more effective way of promoting 'welfare' but also could decrease the welfare bill by reducing health related barriers to employment.

Appendices

2 Appendices for Chapter 2.

2.1 Appendix Systematic review of longitudinal studies investigating the employment effects of common mental health problems.

Search Strategy

We used search terms relating to employment status, mental health condition and study design to search, 9 relevant databases (PsycINFO, MEDLINE, Econlit, Applied Social Sciences Index and Abstracts , Social Services Abstracts, PAIS International, British Humanities Index, EconLit, RePec). We supplemented this by hand-searching the bibliographies of all studies identified. All searches were carried out by the Centre for Reviews and Dissemination at the University of York.

Inclusion criteria

We included all longitudinal studies, of working age populations (16-65), published between 1980 and 2011, that assessed the effect of the presence of anxiety and/or depression on transitions into or out of employment. We only included studies that used a recognised instrument for assessing anxiety and/or depression with published reports of validity. We excluded studies that were cross sectional, where the sample was recruited as part of an intervention, or from health services, where the ascertainment of depression or anxiety was solely based on reported diagnosis and/or treatment or that solely assessed transitions between non-employed states (e.g disability and unemployment). (see Table 12)

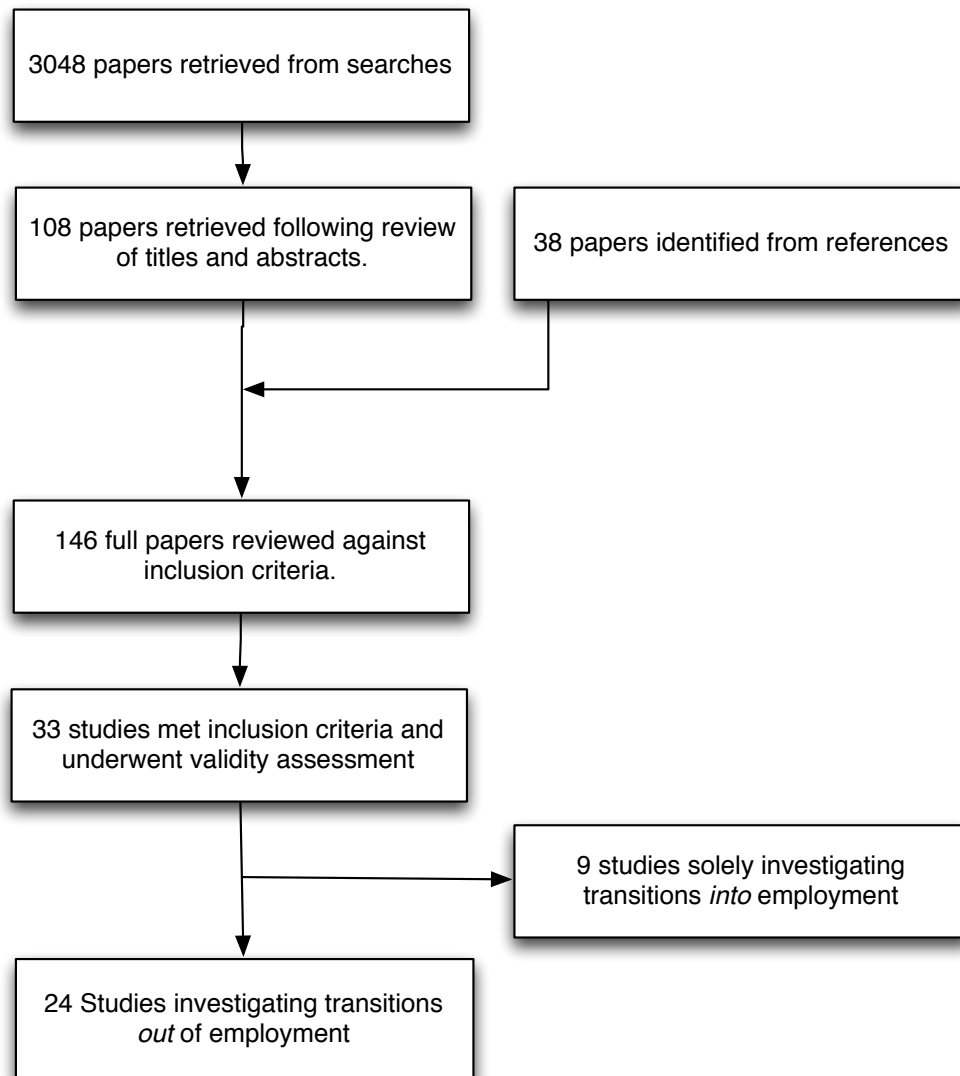
Table 12 Inclusion and exclusion criteria for systematic review of longitudinal studies investigating the employment effects of common mental health problems.

	Inclusion criteria	Exclusion criteria
Study design	Any quantitative study using longitudinal data (at least 2 time periods), including, cohort studies, follow up studies and analysis of longitudinal and panel surveys.	Cross sectional or retrospective study designs. Cross sectional analysis of longitudinal datasets Intervention studies.
Population	Community samples of people of working age 16-65 from the general population.	Exclude studies where people recruited as part of intervention. Exclude samples only including people accessing treatment.
Exposure	Community based studies investigating the effect of Depression and/or Anxiety or Common Mental Disorder on transitions in or out of employment. Where presence of anxiety and/or depression or Common Mental Disorder is determined using a recognised instrument, with reported reliability and validity. Include studies using symptom scales (e.g GHQ) that have demonstrated validity as measuring the presence of common mental disorders.	Exclude studies primarily of people with: <ul style="list-style-type: none"> - Psychotic Disorders - Bipolar disorder - Learning disabilities - Physical disorders/ disabilities/ diseases. - People misusing drugs or alcohol. Exclude studies just using reported diagnosis of mental disorder. Exclude studies just including people accessing treatment. Exclude studies only investigating specific CMDs other than Depression and or anxiety (e.g Insomnia)
Outcomes	Duration in or transitions into or out of <ul style="list-style-type: none"> - employment - non-employment - unemployment - long term sickness absence (>3 months) - disability benefits Labour market participation. Transitions into retirement	Studies just investigating effects on changes in work contract/ work pattern/ productivity Studies investigating duration of maternity leave. Studies where outcome is social functioning scale Studies only investigating transitions between non employment categories (i.e between long term sickness absence and unemployment)

Selection of studies

Clearly irrelevant papers were excluded by the lead reviewer based on the title and abstract. Studies were then assessed by two reviewers for inclusion against the above criteria based on the full text. A total of 3048 papers were retrieved from the searches. After exclusion of irrelevant papers based on the title and abstract, 108 full papers from these searches were checked against inclusion criteria. In this process a further 38 potential papers were identified from references, resulting in 146 full papers reviewed in total. Thirty-three of these were found to meet the inclusion criteria. The studies identified were further categorised into those that investigated transitions *out of* and those that investigated transitions *into* employment. (see Figure 17).

Figure 25. Selection of studies for systematic review of longitudinal studies investigating the employment effects of common mental health problems.



Validity Assessment.

A simple framework based on core epidemiological principles was developed for assessing study validity. This framework was used to score each study out of 20 depending on how closely they conformed to the ideal study design and analysis.

Meta-analysis.

Studies that reported measures of relative risk (Risk, Odds or Hazard ratios) were included in the meta-analysis. Meta-regression was used to determine whether

effect sizes differed between sub groups, based on age, sex, condition, baseline prevalence, destination state or country. Where single studies reported multiple estimates for different sub groups these were combined where relevant using the inverse-variance weighted average⁴⁰⁶ to provide a single estimate per study. We assumed that different studies were estimating different, yet related, effects, and therefore used DerSimonian and Laird random effects method to estimate pooled effect sizes across studies.⁴⁰⁶ We investigated the heterogeneity between studies using the I^2 test. We investigated evidence of publication bias, with a funnel plot and Egger's test. All analyses were carried out using the meta-analysis commands of Stata 12^{407,408}

Table 13 Summary of study details included in the systematic review.

	Author	Population	Age group	Data source	Sample size	Instrument	VA	Effect measure	Average effect size	Significantly increased risk (p<0.05)
1	Dooley, et. al. 2002	General population	28-36	National Longitudinal Survey of Youth (NLSY)	3678	CESD	8	OR	not reported	No
2	Dooley, et. al. 2000	General population	28-37	National Longitudinal Survey of Youth (NLSY)	5113	CESD	9	OR-unit increase	1.19	Yes
3	Doshi, et. al. 2008	General population	53-58	Health and Retirement Study(HRS)	2853	CESD	14	OR	1.39(1.16-1.66)	Yes
4	Emptage, et. al. 2005	General population	50-61	Health and Retirement Study(HRS)	8280	CESD	9	OR	1.02(0.81-1.28)	No
5	Frijters, et. al. 2010	General population	22-64	Household, Income and Labour Dynamics in Australia (HILDA)	53636	SF26	14	RD per 1 SD	0.173	Yes
6	Garcia-Gomez, et. al. 2008	General population	16-64	British Household Panel Survey (BHPS)	5626	GHQ	16	HR unit increase	1.047	Yes
7	Hamilton, et. al. 1997	General population	16-65	Local survey	447	PSI	8	?	?	Yes
8	Hamilton, et. al. 1993	Blue Collar workers	16-65	Michigan Health and Social Security Research Institute panel survey	1007	Hopkins	8	RD	0.08	Yes
9	Karpansalo, et. al. 2005	General population	42-60	Kuopio ischaemic heart disease risk factor study (KIHD).	1726	HPLD	12	OR	1.43(1.15-1.78)	Yes
10	Kennedy, et. al. 2003	Immigrants	16-65	Longitudinal Survey of Immigrants to Australia (LSIA)	6889	GHQ	6	OR	1.57(1.05-2.36)	Yes
11	Lamberg, et. al. 2010	General population	20-54	The HeSSup Study	14487	BDI	9	OR	2.36(1.84-3.03)	Yes
12	Luo, et. al. 2010	General population	18-60	NESARC National Survey of Alcohol and related conditions	21534	AUDADIS	10	OR	1.88(1.55-2.27)	Yes
13	Patten, et. al. 2009	General population	26-65	National Population Health Survey (NPHS)	6570	CIDI-SF	14	HR	1.68(1.29-2.18)	Yes
14	Rice, et. al. 2011	General population	50-65	English Longitudinal study of ageing	1693	CESD	11	OR	1.53(1.10-2.14)	Yes
15	Tian, et. al. 2004	General population	51-61	Health and retirement study	4799	CESD	9	OR	1.46(1.14-1.86)	Yes
16	Whooley, et. al. 2002	General population	18-30	Coronary Artery Risk Development in Young Adults (CARDIA) study.	2334	CESD	10	OR	1.60(1.28-1.99)	Yes
17	Wray, et. al. 2003	General population	51-60	Health and retirement study	3540	CESD	11	OR-unit increase	1.26	Yes
18	Overland, et. al. 2008	General population	20-65	The Health Study of Nord- Trøndelag County (HUNT-2)	37302	HADS	13	OR	1.56(1.25-1.95)	Yes
19	Dooley, et. al. 1994	General population	16-65	Epidemiological Catchment Area Survey	4075	DIS	10	OR	0.79(0.12-5.22)	No
20	Manninen, et. al. 1997	Farmers	18-64	Local survey	8655	SCL90	15	HR	1.44(1.28-1.61)	Yes
21	Mykletun, et. al. 2006	General population	20-65	The Health Study of Nord- Trøndelag County (HUNT-2)	45782	HADS	15	OR	1.83(1.63-2.06)	Yes
22	Rai, et. al. 2011	General population	18-64	Stockholm Public Health Cohort survey	17205	GHQ	17	HR	3.04(2.59-3.56)	Yes
23	Gresenz, et. al. 2004	General population	19-60	Health care for communities survey	5211	CIDI-SF	8	OR	1.44(0.98-2.12)	No
24	Slade, et. al. 2000	General population	>22	Epidemiological Catchment Area Survey	1005	DIS	9	HR	1.65(1.13-2.42)	Yes

3 Appendices for Chapter 4 – Study 2.

3.1 Appendix. - Descriptive Statistics

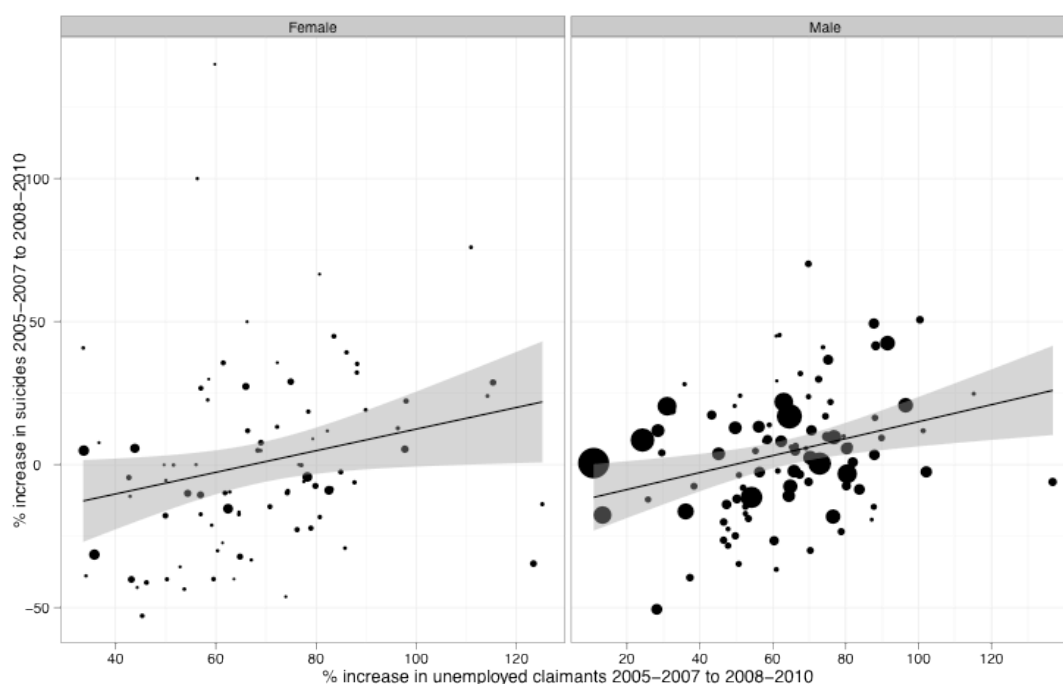
Table 14. Descriptive statistics for Study 2 - Suicides associated with the 2008-10 economic recession in England: time trend analysis

Variable	Number of Local Area-Years	Mean	Min	Max	Source
Male suicides	1023	35.24 (24.82)	2	139	National Clinical and Health Outcomes Database (NCHOD)
Female suicides	1023	11.89 (9.36)	0	55	National Clinical and Health Outcomes Database (NCHOD)
Male claimants	1023	6528.07 (6720.90)	928	53287	The Office for National Statistics (ONS) NOMIS
Female claimants	1023	2396.55 (2734.65)	377	27130	The Office for National Statistics (ONS) NOMIS
Male suicide change	1023	0.05 (0.42)	-0.81	4.5	National Clinical and Health Outcomes Database (NCHOD)
Female suicide change	1017	0.16 (0.81)	-1	9	National Clinical and Health Outcomes Database (NCHOD)

3.2 Appendix. - Unadjusted associations, pre- and post-recession

The figure below shows the unadjusted association of the increase in unemployment in each area before (years 2005-2007) and after (2008-2010) the onset of recession with the change in suicides. While a significant association is observed for both men ($r = 0.29$, $p=0.005$) and women ($r = 0.25$, $p=0.014$), this unadjusted correlation may over estimate the association as compared to the fixed effects model.

Figure 26 Unadjusted association of the percentage increase in the number of unemployed men and women with the percentage increase in the number of suicides, before- and after- the 2008 recession, by sex



Notes: Each dot represents a local area (classified based on NUTS3 areas of county Councils and groups of unitary authorities); points shading representing weighting for the number of suicides in 2005-2007.

3.3 Appendix. - Modeling lead and lagged effects

Table 15. Lagged models for Study 2 - Suicides associated with the 2008-10 economic recession in England: time trend analysis

	Male Suicide	Female Suicide
Current Unemployment Change	1.8%** [0.7,2.9]	-1.5% [-6.9,4.6]
Previous Year's Unemployment Change	-0.8% [-1.9,0.3]	0.6% [-1.4,2.6]
Previous Two Year's Unemployment Change	0.6% [-0.9,2.1]	-0.8% [-2.9,4.5]
Number of local area-years	1395	1385
R^2	0.037	0.038

95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Since unemployment is a 'lagging indicator of the economy, it has been speculated that the anticipation of unemployment may create fear and anxiety, corresponding to elevated risks of suicides. As shown below, such effects were not observed in our model.

Table 16. Lead models for Study 2 - Suicides associated with the 2008-10 economic recession in England: time trend analysis

	Male Suicide	Female Suicide
Two Year's Prior to Unemployment Change	-0.1% [-1.4,1.1]	-1.8 [-3.7,0.1]
Year Prior to Unemployment Change	0.6% [-0.2,1.4]	-1.2 [-0.7,3.0]
Current Unemployment Change	2.2%** [0.051,0.39]	-0.9 [-3.8,2.0]
Number of local area-years	1395	1386
R^2	0.040	0.045

95% confidence intervals in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

3.4 Appendix. - Alternative models before and during recession.

Table 17. Replication of analysis for years of falling unemployment (1993-2005) and years of rising unemployment (2006-2010), with controls for time-trends.

	Percentage Change in Suicide Rates		
	All years	1993-2005 (years of falling unemployment)	2006-2010 (years of rising unemployment)
<i>Men</i>			
10% change in the number claimants	1.6** [0.9,2.4]	2.5* [0.4,4.5]	1.5** [0.5,2.4]
<i>Women</i>			
10% change in the number claimants	0.80 [-1.1,2.7]	-0.9 [-4.1,2.4]	1.0 [-1.7,3.7]

Notes: 95% confidence intervals in brackets based on robust standard errors clustered by local area to reflect non-independence of sampling. Model based on equation 1. Number of local area years is 1581 for all years, 1116 for 1993-2005 and 465 for 2006-2010.

* $p < 0.01$, ** $p < 0.001$.

Test for effect heterogeneity between time periods, for male model, $p=0.35$,

Seemingly Unrelated Estimation (SUEST) Test

Table 18. Replication of analysis for years of falling unemployment (1993-2005) and years of rising unemployment (2006-2010), *without* controls for time-trends.

	Percentage Change in Suicide Rates		
	All years	1993-2005 (years of falling unemployment)	2006-2010 (years of rising unemployment)
<i>Men</i>			
10% change in the number claimants	1.2*** [0.7,1.8]	1.4* [0.1,2.8]	0.15*** [0.6,2.3]
<i>Women</i>			
10% change in the number claimants	0.7 [-0.5,0.2]	-0.05 [-2.2,2.1]	1.6 [-0.6,3.8]

Notes: 95% confidence intervals in brackets based on robust standard errors clustered by local area to reflect non-independence of sampling. Model based on equation 1 but without controls for time-trends. Number of local area years is 1581 for all years, 1116 for 1993-2005 and 465 for 2006-2010.

* $p < 0.01$, ** $p < 0.001$

Model equation: Equation 1: $\Delta \text{Suicide}_{i,t} = \beta \Delta \text{Unemp}_{i,t} + \mu_i + \mu_i \times t + t + \varepsilon_{i,t}$

Where i is the English area (based on the NUTS3 area classification) and t is the year. Δ is the first-year difference of log suicides and claimants, expressed as the percentage change; β is the coefficient describing the percentage increase in suicides associated with each percentage increase in the number of unemployed claimants. μ is a set of region dummy variables, and t is a time-trend

3.5 Appendix. - Replication of analysis excluding undetermined injuries.

Table 19. Replication of analysis excluding undetermined injuries.

	<u>Male Suicide Rates</u>	<u>Female Suicide Rates</u>
10% rise in the number of male claimants	1.3%* [95% CI: 0.35% to 2.3%]	—
10% rise in the number female claimants	—	-0.2% [95% CI: -3.2% to 2.8%]

Notes: 95% confidence intervals in brackets. Model based on equation 1. Number of local area years is 1022 among men and 990 among women.

* $p < 0.001$

3.6 Appendix. - Replication of analysis using data during the early 1990s recessions.

This analysis was not included in the original paper published in the BMJ.

Table 20. Replication of analysis using data during the early 1990s recessions.

	<u>Male Suicide Rates</u>	<u>Female Suicide Rates</u>
10% rise in the number of male claimants	0.4%* [95% CI: 0.06% to 0.8%]	—
10% rise in the number female claimants	—	0.5% [95% CI: -0.6% to 1.5%]

Notes: 95% confidence intervals in brackets. Model based on equation 1. Number of local area years is 1086

* $p < 0.05$

Test for effect heterogeneity between recessions for male model, $p=0.037$,

Seemingly Unrelated Estimation (SUEST) Test.

4 Appendices for Chapter 5 – Study 3.

4.1 Appendix. - Survey questions, response rates and discontinuities in the QLFS

1. Self reported Mental health problem in the QLFS.

In the labour force survey respondents are first asked:

Do you have any health problems or disabilities that you expect will last for more than a year? [LNGLIM]

They are then asked:

Do you have... *Code all that apply* [HEAL0...HEAL09]

1 problems or disabilities (including arthritis or rheumatism) connected with your arms or hands?

2 ...legs or feet?

3 ...back or neck?

4 difficulty in seeing (while wearing spectacles or contact lenses)?

5 difficulty in hearing?

6 a speech impediment?

7 severe disfigurements, skin conditions, allergies?

8 chest or breathing problems, asthma, bronchitis?

9 heart, blood pressure or blood circulation problems?

10 stomach, liver, kidney or digestive problems?

11 Diabetes?

12 depression, bad nerves or anxiety?

13 Epilepsy?

14 severe or specific learning difficulties?

15 mental illness or suffer from phobias, panics or other nervous disorders?

16 progressive illness not included elsewhere (eg cancer not included elsewhere, multiple sclerosis, symptomatic HIV, Parkinson's disease, Muscular Dystrophy)?

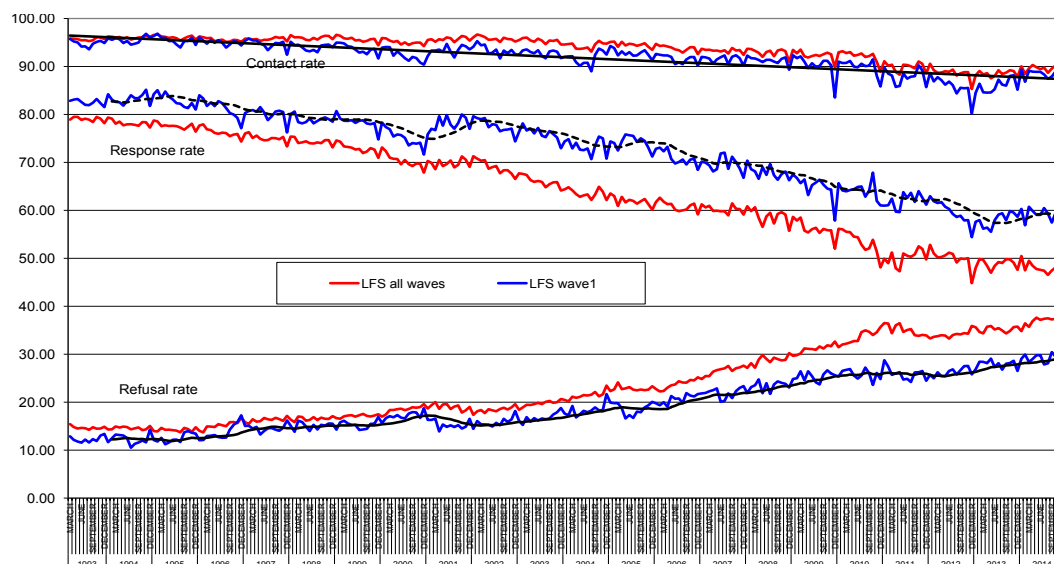
17 other health problems or disabilities?

We defined people as having a self-reported mental illness if they replied yes to the first question [LNGLIM] and were coded as 12 or 15 in any of their responses to the second question [HEAL0...HEAL17]. They were coded as not having a self reported

mental illness if they did not give a response coded as 12 or 15 but did provide a valid answer to the first question.

2. Response rates in the LFS.

Figure 27 Response, refusal and contact rates in the QLFS 1993-2014 (sources ONS)



3. Discontinuities in the LFS health module.

Between quarter four 2009 and quarter one 2010 the ONS noted that there appeared to be a discontinuity in disability rates calculated from the QLFS. This was not due to any change in the questions and appears to have been due to the addition of a short introduction at the start of the health module:

“I should now like to ask you a few questions about your health. These questions will help us estimate the number of people in the country who have health problems.”

This resulted in a small increase in the proportion of the population reporting health problems, but there was no change in the characteristics of this population and the ONS concluded that this increase was random.²⁸² We account for this in our analysis by including a dummy variable in the segmented regression see Appendix

2.

4.2 Appendix. - Segmented regression.

1. *Identifying a breakpoint in the trend.*

We fitted a segmented regression model to data of quarterly prevalence rates of self-reported mental health problems in England. The model allowed for separate trends before and after a specified time point (breakpoint) by including 2 linear spline terms for time, where the second term is set to zero before the specified breakpoint. i.e a linear regression of the form:

$$\text{Model 1. } \text{MENTAL}_{t_i} = B_1 \text{ TIME1} + B_2 \text{ TIME2} + \text{CONS} + \varepsilon$$

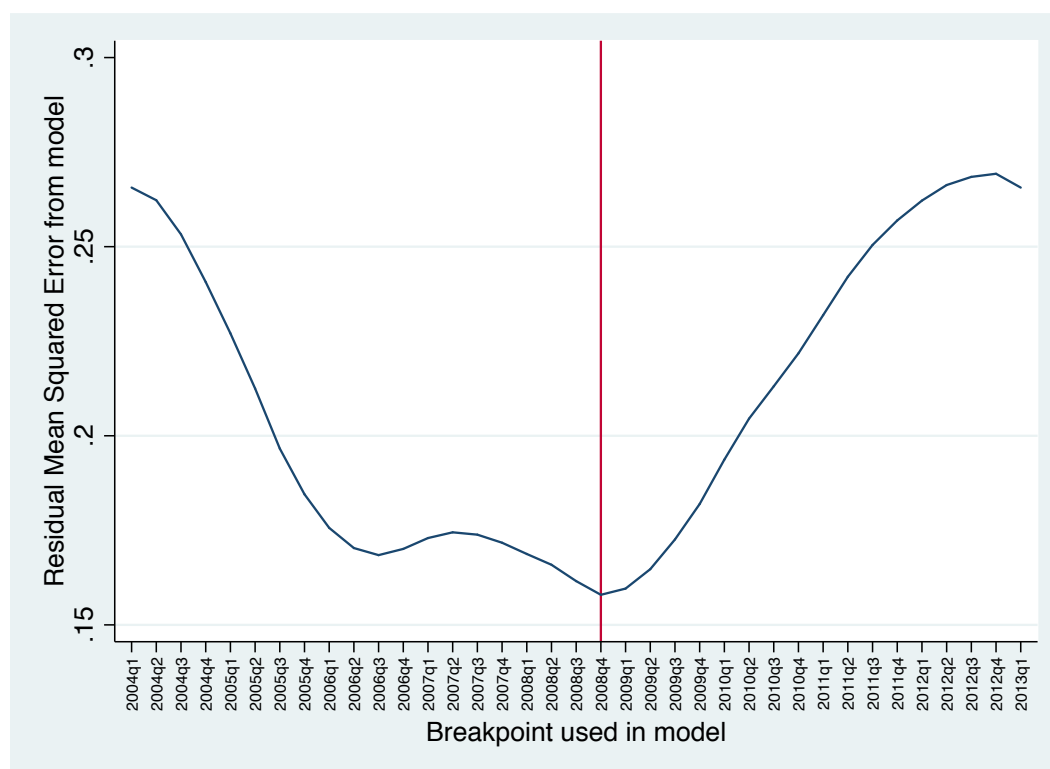
Where MENTAL_{t_i} is the prevalence of self reported mental health problems in quarter t

TIME1 is a quarterly trend term

TIME2 is a trend term (marginal spline) that starts after the breakpoint and is zero at other times.

To identify if and whether there was a significant change in the trend in the prevalence of mental health problems between 2004 and 2013 we fitted the model above iteratively using a different break point in each iteration. We fitted models separately using each quarter from 2004 Q1 to 2013 Q1 as the breakpoint. We then plotted the residual mean squared error (RMSE) from each of these models to identify the breakpoint that provided the best fit with the data. In other words we fitted 36 separate models each with a different break point. Figure 20 shows the RMSE from each of these models – indicating that a breakpoint at 2008Q4 provides a better fitting model than all other alternative break points. The model with just a linear time trend and no breakpoint had a RMSE of 0.267 higher than all of the models that included a linear spline.

Figure 28. Residual mean squared errors from 36 models with a linear spline at different breakpoints.



The analysis in Figure 28 indicates that modelling a change in trend at 2008Q4 provides a better fitting model than alternatives and therefore this was used as the breakpoint in the segmented regression.

2. Using segmented regression assess separate trends by educational group.

To investigate whether the change in trend from 2008Q4 differed by gender and educational group we fitted the regression model to prevalence data disaggregated by educational level and gender and including interactions between two time trend terms and variables indicating gender and educational level. To account for the discontinuity in the data series due to changes in the questionnaire we also included a dummy variable that was equal to 1 from 2010 quarter 1 onwards and zero otherwise and included all interactions between this, gender and educational level. Therefore the regression model was:

$$\text{Model 2. MENTAL} = B_1 \text{ TIME1} + B_2 \text{ TIME2} + B_3 \text{ LOWED} + B_4 \text{ SEX} + B_5 \text{ LOWED} * \text{TIME1} + B_6 \text{ LOWED} * \text{TIME2} + B_7 \text{ SEX} * \text{TIME1} + B_8 \text{ SEX} * \text{TIME2} + B_9$$

$$\text{MENTAL}_{i,t} = \beta_0 + \beta_1 \text{TIME1} + \beta_2 \text{TIME2} + \beta_3 \text{DISCON} + \beta_4 \text{LOWED} + \beta_5 \text{DISCON} \times \text{LOWED} + \beta_6 \text{SEX} + \beta_7 \text{DISCON} \times \text{SEX} + \beta_8 \text{LOWED} \times \text{SEX} + \beta_9 \text{DISCON} \times \text{LOWED} \times \text{SEX} + \epsilon$$

Where $\text{MENTAL}_{i,t}$ is the prevalence of self reported mental health problems in quarter t and educational/gender group i .

TIME1 is a quarterly trend term

TIME2 is a trend term (marginal spline) that starts after the breakpoint and is zero at other time.

SEX is a dummy variable indicating sex.

LOWED is a dummy variable indicating low education and

DISCON is a dummy variable that is equal to 1 from 2010 quarter 1 and zero otherwise

Web Table 21 shows the estimates from this segmented regression model of the trend in each group before and after the first quarter of 2009 and the trend in inequalities in these two intervals as measured by the annual change in the gap in prevalence rates between high and low educated groups.

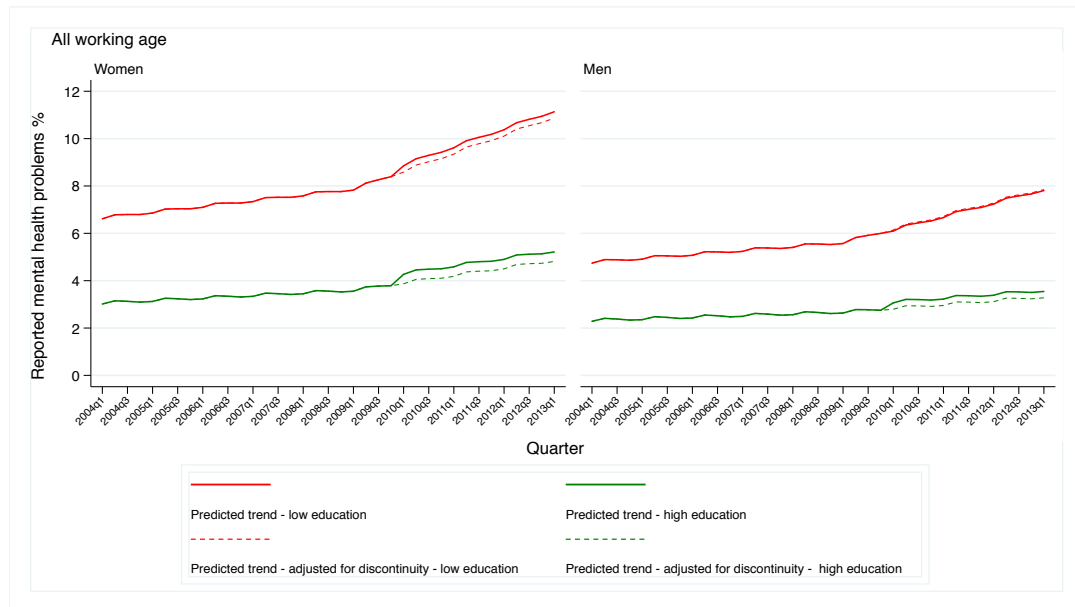
Table 21. Annual change in prevalence rates before and after 2009 quarter 1 by gender and educational group and the annual change in the gap in prevalence rates between high and low educated groups estimated from segmented regression model.

	Annual change in prevalence rates 2004Q1 to 2008Q4			Annual change in the gap 2004Q1 to 2008Q4			Annual change in prevalence rates 2009 Q1 to 2013Q1			Annual change in gap from 2009 Q1 to 2013Q1		
		95% CI			95% CI			95% CI			95% CI	
High educated women	0.1	0.06	0.15	0.13	0.05	0.2	0.31	0.23	0.38	0.43	0.29	0.57
Low Educated women	0.23	0.16	0.29				0.74	0.61	0.86			
High educated men	0.07	0.04	0.1	0.09	0.01	0.16	0.15	0.02	0.27	0.41	0.19	0.62
Low educated men	0.15	0.08	0.23				0.55	0.38	0.73			

Investigating the effect of the discontinuity in the QLFS data.

The segmented regression model above was used to investigate the impact on trends in self reported mental health problems of the discontinuity in the QLFS that occurred between quarter four 2009 and quarter one 2010. Figure 21 shows the estimated trends in self-reported mental health problems in the presence and absence of the discontinuity. This indicates that the change in the questionnaire resulted in a slight increase in prevalence that was slightly greater amongst higher educated groups but this does not change the overall conclusion that the trend increased from 2008 quarter 4 and the increase was greatest amongst low educated groups.

Figure 29. Trend in prevalence in self reported mental health problems showing effect of discontinuities in the data series.



4.3 Appendix. - Panel data regression models.

1. Models investigating association between local trends in self reported mental health problems and local trends in unemployment rates and median wages.

We used a panel data set of aggregate quarterly local authority data to investigate the association between local trends in mental health problems and local trends in unemployment and wages. We estimated a linear fixed effects regression model of the form

$$\text{Model 3. } \text{MENTAL}_{i,t} = \beta_1 \text{UNEMP}_{i,t} + \beta_2 \text{WAGE}_{i,t} + \beta_3 \text{TIME1} + \beta_4 \text{TIME2} + \text{CONS} + \mu_i + \varepsilon_{i,t}$$

Where:

$\text{MENTAL}_{i,t}$ is the prevalence of self reported mental health problems in quarter t in local authority i

$\text{UNEMP}_{i,t}$ is the unemployment rate in quarter t in local authority i

$WAGE_{i,t}$ is the median wages in year t in local authority i

TIME1 is a quarterly trend term

TIME2 is a trend term (marginal spline) that starts after 2008 Q4 and is zero at other times.

μ_i is a set of dummy variables for each local authority.

CONS is a constant.

$\varepsilon_{i,t}$ is an error term

The parameters from this model (shown in Table 4) were then used to indicate the contribution of these economic trends to increases in mental health problems by estimating the trend in mental health problems in England in four hypothetical scenarios:

- (1) Assuming unemployment and wages as observed over this time period i.e the predictions from model 3 above using national rates for UNEMP and WAGES.
- (2) Assuming unemployment rates had not increased from the pre crisis level in 2007 quarter 4. i.e the predictions from model 3 above with UNEMP set to equal the 2007 quarter 4 values for all quarters after 2007 Q4
- (3) Assuming wages had also not fallen from their peak in 2009, i.e the predictions from model 3 above with WAGES additionally set to equal the 2009 values for all years after 2009
- (4) Assuming there was no change from the pre-crisis trend in mental health problems. i.e the predictions from model 3 TIME2 additionally set to equal zero.

This gives the estimates shown in Figure 18. The increase in the prevalence of self reported mental health problems explained by trends in unemployment and wages - estimated from panel regression model given in Appendix 4.3.

2. Models investigating association between self reported mental health problems, suicides and antidepressant prescribing.

The results in Table 5. Increase in suicides and antidepressant items prescribed in each local authority area associated with each additional 10,000 people reporting a mental health problem. are derived from similar fixed effects regression models using local authority annual panel data that included annual data of local authority suicide rates and antidepressant prescribing rates.

$$\text{SUICIDE}_{i,t} = \beta_1 \text{MENTAL}_{i,t} + \beta_2 \text{TIME1} + \beta_3 \text{TIME2} + \text{CONS} + \mu_i + \varepsilon_{i,t}$$

$$\text{ANTIDEP}_{i,t} = \beta_1 \text{MENTAL}_{i,t} + \beta_2 \text{TIME1} + \beta_3 \text{TIME2} + \text{CONS} + \mu_i + \varepsilon_{i,t}$$

Where:

$\text{MENTAL}_{i,t}$ Is the prevalence of self reported mental health problems in year t in local authority i

$\text{SUICIDE}_{i,t}$ is the rate of suicides per 100,000 in year t in local authority i

$\text{ANTIDEP}_{i,t}$ is the antidepressant prescribing rate per 100,000 in year t in local authority i

TIME1 is an annual trend term

TIME2 is an annual trend term (marginal spline) that starts from 2009 and is zero at other times.

μ_i is a set of dummy variables for each local authority.

CONS is a constant.

$\varepsilon_{i,t}$ is an error ter

5 Appendices for Chapter 6– Study 4.

5.1 Appendix. - Self reported mental health problems in the QLFS.

In the labour force survey respondents are first asked:

Do you have any health problems or disabilities that you expect will last for more than a year? [LNGLIM]

They are then asked:

Do you have... *Code all that apply* [HEAL0...HEAL17]

- 1 problems or disabilities (including arthritis or rheumatism) connected with your arms or hands?
- 2 ...legs or feet?
- 3 ...back or neck?
- 4 difficulty in seeing (while wearing spectacles or contact lenses)?
- 5 difficulty in hearing?
- 6 a speech impediment?
- 7 severe disfigurements, skin conditions, allergies?
- 8 chest or breathing problems, asthma, bronchitis?
- 9 heart, blood pressure or blood circulation problems?
- 10 stomach, liver, kidney or digestive problems?
- 11 Diabetes?
- 12 depression, bad nerves or anxiety?
- 13 Epilepsy?
- 14 severe or specific learning difficulties?
- 15 mental illness or suffer from phobias, panics or other nervous disorders?
- 16 progressive illness not included elsewhere (eg cancer not included elsewhere, multiple sclerosis, symptomatic HIV, Parkinson's disease, Muscular Dystrophy)?
- 17 other health problems or disabilities?

We defined people as having a self-reported mental health problem if they replied yes to the first question [LNGLIM] and were coded as 12 or 15 in any of their responses to the second question [HEAL0...HEAL17]. They were coded as not having a self reported mental health problem if they did not give a response coded as 12 or 15 but did provide a valid answer to the first question.

Discontinuities in the LFS health module.

Between quarter four 2009 and quarter one 2010 the ONS noted that there appeared to be a discontinuity in disability rates calculated from the QLFS. This was not due to any change in the questions and appears to have been due to the addition of a short introduction at the start of the health module:

“I should now like to ask you a few questions about your health. These questions will help us estimate the number of people in the country who have health problems.”

This resulted in a small increase in the proportion of the population reporting health problems, but there was no change in the characteristics of this population and the ONS concluded that this increase was random.²⁸² It therefore should not bias results in this analysis.

In 2013 Q2 the filter question identifying people with long term health problems was changed from:

Do you have any health problems or disabilities that you expect will last for more than a year? [LNGLIM]

To

Do you have any physical or mental health conditions or illnesses lasting or expecting to last 12 months or more? [LNGLST]

The questions referring to the types of health problems [HEAL0...HEAL17] remained the same.

To adjust for these changes in the questionnaire we included a dummy variable indicating the periods 2010q1 to 2013q1 and 2013q2-2013q4 in the regression model.

Correlation between self reported mental health problems and antidepressant prescribing rates.

We show below that local authority prevalence rates of mental health problems defined in this way correlates reasonably closely with antidepressant prescribing rates, both in terms of level and in terms of change over time.

Figure 30 shows the prevalence in mental health problems for each local authority reported in the labour force survey correlated with the rate of antidepressant prescribing in each area. We also find that the change in the prevalence of mental health problems reported in an LA is associated with the change in the antidepressant prescribing rate (see Figure 2). As the estimates of the prevalence of mental ill-health are based on quite small samples in each LA, there is some degree of random measurement error, this is exacerbated in the differenced analysis in Figure 23. However even though there is quite a lot of random noise in the data the fact that we still find a relatively high level of correlation in Figure 23 – indicates that these two indicators are measuring similar phenomena, namely the burden of diagnosed common mental health problems in the population.

Figure 30. Correlation between quarterly antidepressant prescribing rate and quarterly prevalence of mental health problem reported in QLFS for each upper tier local authority in England.

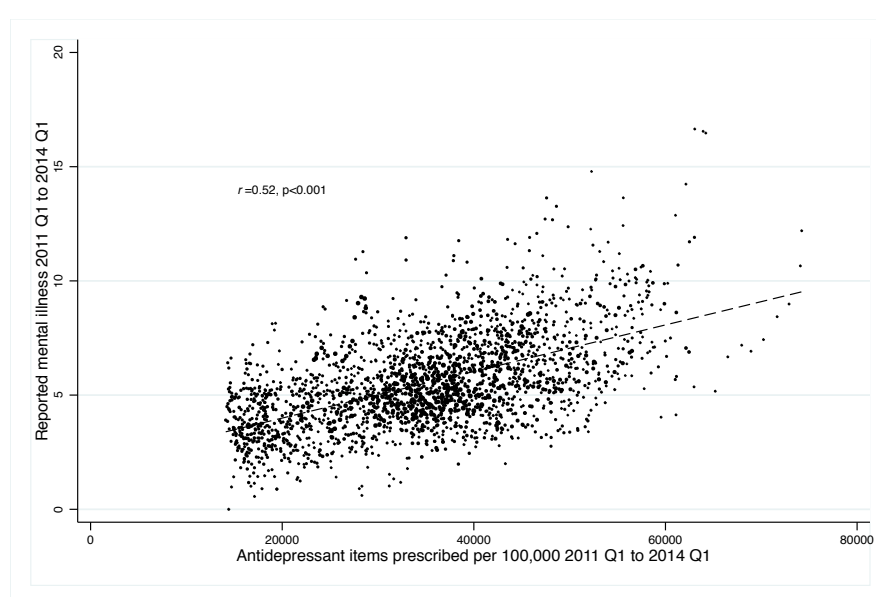
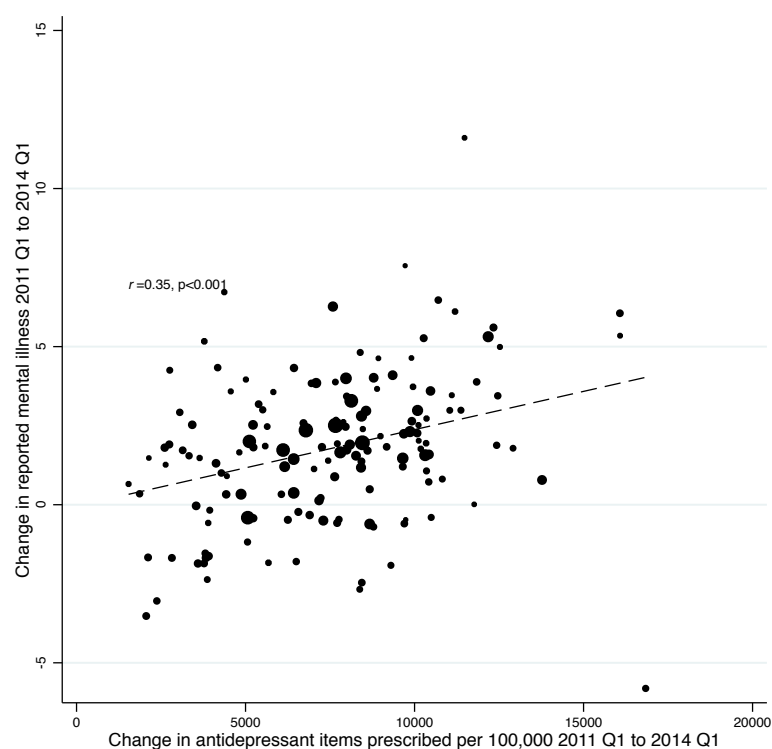


Figure 31. Correlation between change over 3 years in antidepressant prescribing rate and quarterly prevalence of mental health problems reported in Labour Force Survey within each upper tier local authority in England.



5.2 Appendix. - Summary Statistics for Study 3.

Table 22. Summary statistics for Study 4 exposure (reassessment rate) and outcomes (suicide, self reported mental health problems, and antidepressant prescribing) For England as whole and by level of deprivation 2010 to 2013.

Reassessments between 2010-2013					
	Area	Number	Average rate per 100,000	Min	Max
Quintiles of deprivation (IMD)	Total	1033600	1,920	646	4401
	1	176160	1198	646	1834
	2	233170	1654	1185	2252
	3	177330	2028	1266	2851
	4	219100	2636	1697	3533
	5	227840	2786	1516	4401
Suicides 18-64 year olds between 2010-2013.					
	Area	Number	Average rate per 100,000	Min	Max
Quintiles of deprivation (IMD)	Total	14994	12	5	19
	1	3789	11	5	17
	2	3713	12	6	15
	3	2556	12	8	17
	4	2554	13	7	18
	5	2382	12	6	19
Self reported prevalence of mental health problems 18-64 year olds between 2010-2013 * Estimated from survey data.					
	Area	Number*	Average rate per 100,000	Min	Max
Quintiles of deprivation (IMD)	Total	2361300	7040	3555	12367
	1	509370	5543	3835	7034
	2	544200	6090	3784	8447
	3	384403	6909	3555	10337
	4	466127	8495	3777	12367
	5	457196	8178	4889	11128
Antidepressant prescribing between 2010-2013.					
	Area	Number	Average rate per 100,000	Min	Max
Quintiles of deprivation (IMD)	Total	167,393,694	300,657	128,327	535,190
	1	41692865	274565	158807	342099
	2	44958059	307895	152225	439913
	3	26455769	290437	138373	444374
	4	29849844	343042	128327	505483
	5	24437157	286889	136030	535190

5.3 Appendix. - Model formula and full model outputs

Model formula.

Specifically we estimated the following model:

$$\begin{aligned} \text{Eq 1: } \text{MHOUTCOME}_{i,t} = & \beta_1 \text{REASSESS}_{i,t} + \beta_2 \text{UNEMP}_{i,t} + \beta_3 \text{MEDWAGE}_{i,t} + \beta_4 \\ & \text{GVA}_{i,t} + \beta_5 \text{LAEXPRATE}_{i,t} + \text{TIME1} + \text{TIME2} + \beta_6 \text{IMDQ}_i \times \text{TIME1} + \beta_7 \text{GOR}_i \times \text{TIME1} \\ & + \beta_8 \text{IMDQ}_i \times \text{TIME2} + \beta_9 \text{GOR}_i \times \text{TIME2} + \text{CONS} + \mu_i + \varepsilon_{i,t} \end{aligned}$$

Where $\text{MHOUTCOME}_{i,t}$ is the mental health outcome in local authority i in time t as a rate per 100,000 population.

$\text{REASSESS}_{i,t}$ is the cumulative percentage of the population who have experienced a reassessment in local authority i by time t . As the outcome is per 100,000 working age population this variable is reduced by a factor of 10, so that the coefficient reflects the number of additional cases of the mental health outcome per additional 10,000 people reassessed.

UNEMP is the unemployment rate measured as the proportion of the working age population claiming unemployment benefits in local authority i in time t .

LAEXPRATE is the total expenditure of local authority i in year t per head of population in £1000s.

MEDWAGE is the median weekly full time gross wages in £100's in local authority i in time t .

GVA is the Gross Value Added in £1000's for the region including local authority i in time t .

IMDQ_i is the quintile of deprivation of local authority i .

GOR_i is the government office region including local authority i .

μ is a set of local authority dummy variables

TIME1 is a time-trend term. (annual for suicide model and quarterly for self reported mental health problems and antidepressant models)

TIME2 is an additional trend term (spline) to capture any change in trend from 2007, this is equal to zero prior to 2007.

CONS is a constant.

$\epsilon_{i,t}$ is an error term

To aid the interpretability of results the reassessment rate was expressed as rate per total (all age) population for the model with antidepressant prescribing as an outcome, as this outcome was only available as a rate per total population. The other outcomes were all expressed as a rate per working age population (18-64) and hence the reassessment rate was also expressed as a rate per 100,000 working age population (18-64) in these models.

Antidepressant prescribing data was only available from 2010 and therefore these models only included data from 2010 to 2013.

Table 23. Study 4 model output: Suicide Model.

Variable	Coefficient	95% CI	P
REASSESS	5.7	[2.1,9.2]	0.0019
TIME1	-0.2	[-1.5,1.1]	0.746
TIME2	0.2	[-1.3,1.7]	0.8104
UNEMP	0.4	[-0.0,0.8]	0.0529
GVA	0.04	[-0.1,0.05]	0.3417
MEDWAGE	-0.3	[-1.5,0.8]	0.577
LAEXPRATE	1.1	[-1.0,3.2]	0.3141
1.IMDQ#TIME1	0	[0.0,0.0]	.
2.IMDQ#TIME1	0.2	[-0.5,1.0]	0.5425
3.IMDQ#C.TIME1	-0.7	[-1.7,0.3]	0.1809
4.IMDQ#C.TIME1	0.1	[-0.9,1.0]	0.9063
5.IMDQ#C.TIME1	-0.2	[-1.2,0.8]	0.7006
1.IMDQ#TIME2	0	[0.0,0.0]	.
2.IMDQ#TIME2	-0.3	[-1.2,0.5]	0.4711
3.IMDQ#C.TIME2	0.6	[-0.6,1.8]	0.3391
4.IMDQ#C.TIME2	-0.5	[-1.6,0.6]	0.3532
5.IMDQ#C.TIME2	-0.3	[-1.5,0.8]	0.5647
1.GOR#C.TIME1	0	[0.0,0.0]	.
2.GOR#C.TIME1	0.1	[-1.3,1.5]	0.9309
3.GOR#C.TIME1	0.0007	[-1.3,1.3]	0.9991
4.GOR#C.TIME1	-1.7	[-3.6,0.2]	0.0756
5.GOR#C.TIME1	0.5	[-1.0,1.9]	0.5258
6.GOR#C.TIME1	-0.4	[-1.7,0.9]	0.5863
7.GOR#C.TIME1	0.1	[-1.4,1.6]	0.8652
8.GOR#C.TIME1	-0.4	[-1.9,1.0]	0.543
9.GOR#C.TIME1	-1	[-2.4,0.5]	0.1866
1.GOR#C.TIME2	0	[0.0,0.0]	.
2.GOR#C.TIME2	-0.1	[-1.7,1.5]	0.8942
3.GOR#C.TIME2	0.04	[-1.4,1.5]	0.9529
4.GOR#C.TIME2	2.2	[0.1,4.3]	0.0394
5.GOR#C.TIME2	-0.4	[-2.0,1.2]	0.644
6.GOR#C.TIME2	0.5	[-1.0,2.0]	0.496
7.GOR#C.TIME2	0.2	[-1.5,1.9]	0.8044
8.GOR#C.TIME2	0.6	[-0.9,2.2]	0.4189
9.GOR#C.TIME2	1.3	[-0.4,2.9]	0.1287
CONS	12.4	[7.2,17.6]	<0.001
N (LA years)	1450		
r2 - within	0.1		

Figure 32. Study 4 Checking normality of residuals -histogram of residuals – Suicide model

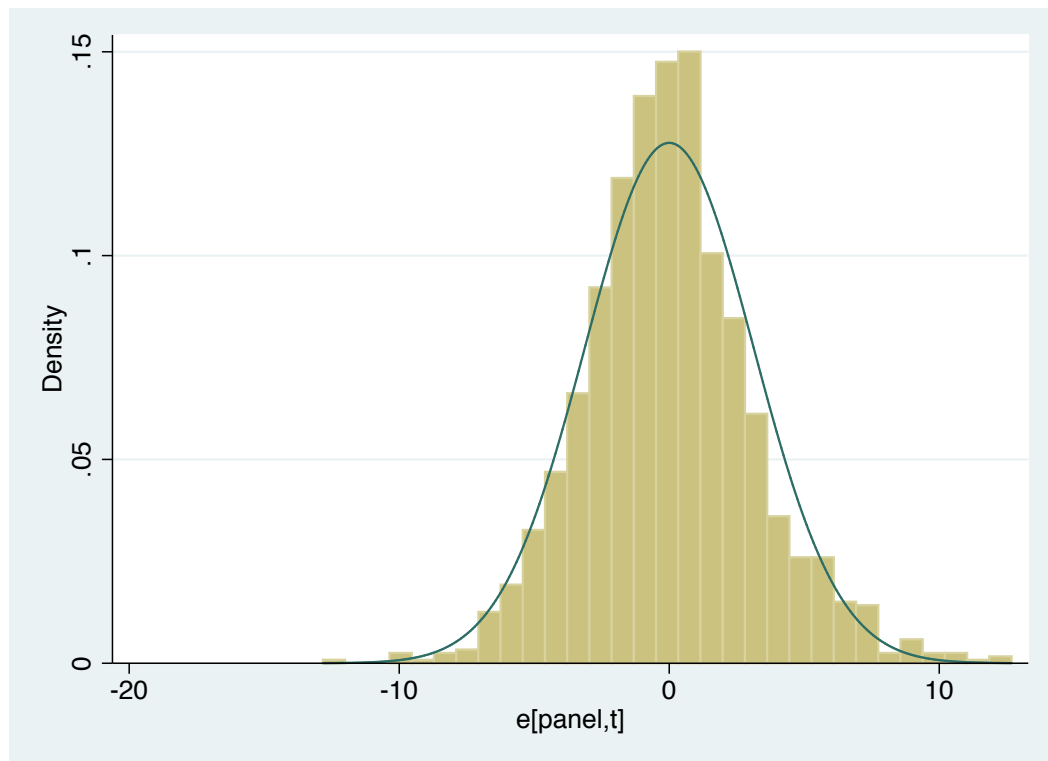


Table 24. Study 4 model output: Self reported mental health model.

Variable	Coefficient	95% CI	P
REASSESS	2695.2	[548.0,4842.4]	0.0142
Period 2004q1-2009q4	0	[0.0,0.0]	.
Period 2010q1-2013q1	501.7	[162.1,841.3]	0.0041
Period 2010q2-2013q4	907.8	[346.7,1469.0]	0.0017
TIME1	17.1	[-69.5,103.7]	0.6967
TIME2	58	[-48.4,164.4]	0.2832
Season 1	0	[0.0,0.0]	.
Season 2	109.4	[21.5,197.4]	0.0151
Season 3	74.2	[-26.3,174.8]	0.1466
Season 4	6	[-84.1,96.1]	0.8954
UNEMP	34.4	[-155.1,223.8]	0.7205
GVA	-17.1	[-46.5,12.2]	0.2499
MEDWAGE	-295.7	[-819.6,228.2]	0.2665
LAEXPRATE	191.7	[-952.9,1336.3]	0.7412
1.IMDQ#TIME1	0	[0.0,0.0]	.
2.IMDQ#TIME1	7.4	[-82.7,97.5]	0.8713
3.IMDQ#C.TIME1	-65.3	[-139.6,9.0]	0.0846
4.IMDQ#C.TIME1	77.2	[9.2,145.1]	0.0263
5.IMDQ#C.TIME1	-55.2	[-152.6,42.3]	0.2649
1.IMDQ#TIME2	0	[0.0,0.0]	.
2.IMDQ#TIME2	-11.9	[-131.2,107.5]	0.8443
3.IMDQ#C.TIME2	55.5	[-38.0,148.9]	0.2425
4.IMDQ#C.TIME2	-94.8	[-186.1,-3.4]	0.0421
5.IMDQ#C.TIME2	57.6	[-71.2,186.3]	0.3783
1.GOR#C.TIME1	0	[0.0,0.0]	.
2.GOR#C.TIME1	9	[-83.6,101.5]	0.8484
3.GOR#C.TIME1	96.3	[-1.5,194.0]	0.0535
4.GOR#C.TIME1	38.2	[-113.4,189.8]	0.6194
5.GOR#C.TIME1	61.6	[-55.8,179.0]	0.3011
6.GOR#C.TIME1	-2.3	[-114.2,109.5]	0.9676
7.GOR#C.TIME1	-10.2	[-130.3,109.9]	0.8672
8.GOR#C.TIME1	-23.3	[-160.9,114.3]	0.7383
9.GOR#C.TIME1	-47.3	[-149.5,54.9]	0.3622
1.GOR#C.TIME2	0	[0.0,0.0]	.
2.GOR#C.TIME2	-11.4	[-119.8,96.9]	0.835
3.GOR#C.TIME2	-177.7	[-294.2,-61.2]	0.003
4.GOR#C.TIME2	-60.3	[-238.8,118.2]	0.5055
5.GOR#C.TIME2	-67	[-207.6,73.7]	0.3481
6.GOR#C.TIME2	-8.5	[-145.9,129.0]	0.9033
7.GOR#C.TIME2	15	[-124.0,154.1]	0.8312
8.GOR#C.TIME2	10.3	[-157.1,177.7]	0.9035
8.GOR#C.TIME2	61.1	[-68.9,191.2]	0.3544
CONS	5277.8	[3138.1,7417.5]	0
N (LA quarters)	5777		

Figure 33. Study 3. Checking normality of residuals - histogram of residuals – Self reported mental health problems model.

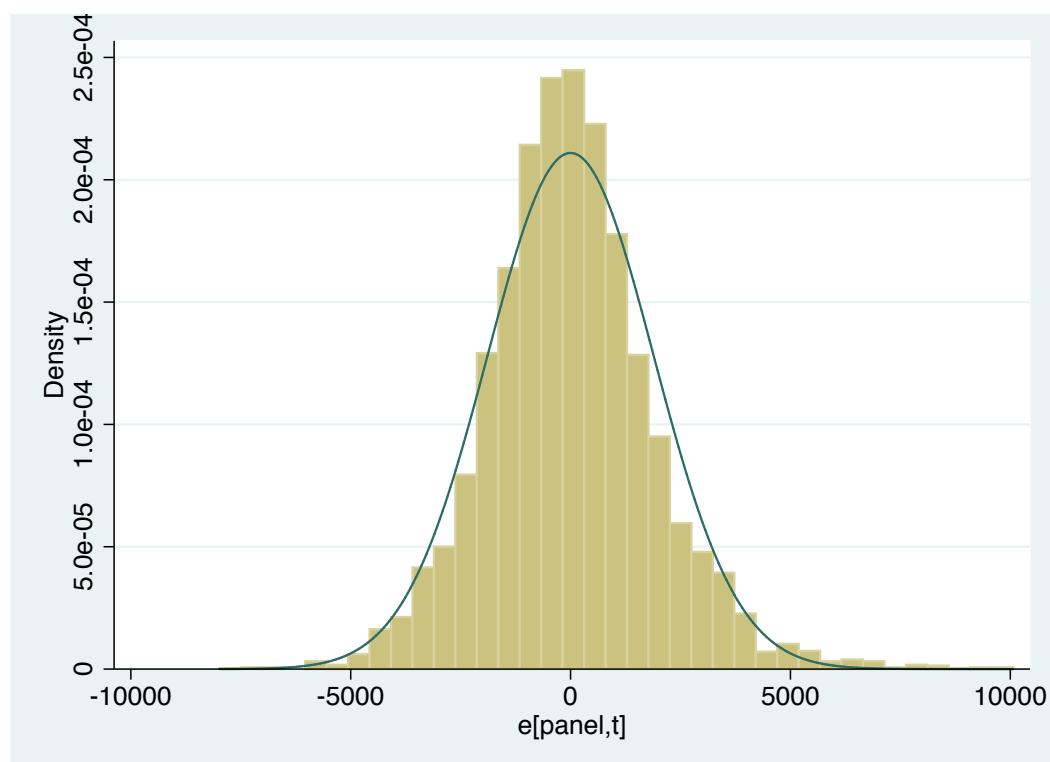
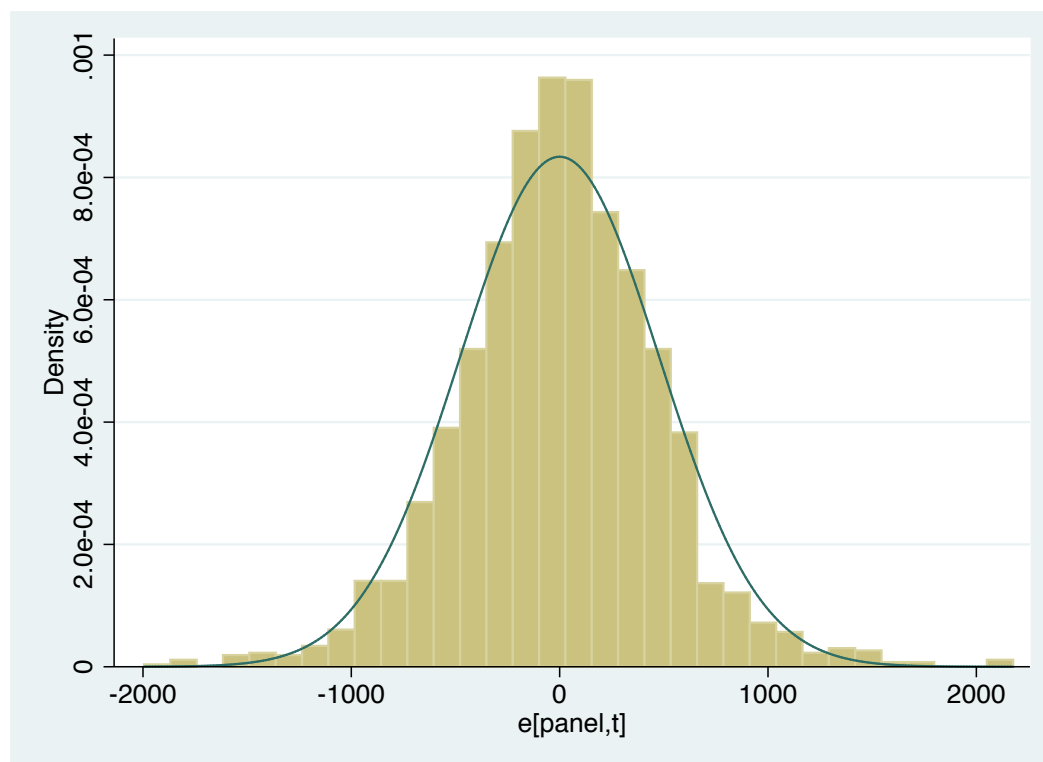


Table 25. Study 4 model output: Antidepressant model.

Variable	Coefficient	95% CI	P
REASSESS	7020.18	[3928.32,10112.05]	<0.001
TIME1	263.21	[194.70,331.72]	<0.001
Season 1	0	[0.00,0.00]	.
Season 2	633.14	[587.50,678.78]	<0.001
Season 3	463.2	[415.96,510.45]	<0.001
Season 4	664.2	[599.14,729.26]	<0.001
UNEMP	379.95	[282.04,477.86]	<0.001
GVA	-3.84	[-57.15,49.47]	0.887
MEDWAGE	-605.36	[-1044.38,-166.34]	0.0072
EXPRATE	1023.25	[97.97,1948.54]	0.0304
1.IMDQ#TIME1	0	[0.00,0.00]	.
2.IMDQ#TIME1	57.76	[23.71,91.81]	0.001
3.IMDQ#C.TIME1	42.78	[-6.37,91.93]	0.0876
4.IMDQ#C.TIME1	-3.55	[-55.48,48.38]	0.8927
5.IMDQ#C.TIME1	-15.79	[-79.02,47.44]	0.6225
1.GOR#C.TIME1	0	[0.00,0.00]	.
2.GOR#C.TIME1	-12.39	[-74.30,49.52]	0.693
3.GOR#C.TIME1	-172.83	[-235.70,-109.95]	<0.001
4.GOR#C.TIME1	142.86	[54.24,231.48]	0.0018
5.GOR#C.TIME1	-10.19	[-73.56,53.17]	0.751
6.GOR#C.TIME1	-70.76	[-131.42,-10.09]	0.0226
7.GOR#C.TIME1	8.71	[-52.40,69.83]	0.7785
8.GOR#C.TIME1	-69.39	[-131.74,-7.03]	0.0294
9.GOR#C.TIME1	3.07	[-65.33,71.47]	0.9295
CONS	8420.76	[4024.54,12816.97]	0.0002
N (LA years)	2086		
r2 - within	0.93		

Figure 34. Checking normality of residuals -- histogram of residuals – Antidepressant model.



5.4 Appendix. - Alternative model specifications.

1. Lagged models.

Table 26. Additional adverse mental health outcomes *in current time period* associated with each 10,000 people in an area experiencing reassessment in *the previous time period* (Antidepressants and self reported mental health problems – previous quarter, suicides – previous year).

	Number	95% CI		p
Items of antidepressants	23398	18540	28257	<0.01
Mental health problems	11417	2432	20402	0.01
Suicides	10	3	17	0.01

Note : Models included controls for local authority fixed effects, time trends 2004 to 2006 and 2007 to 2013, season, quarterly unemployment rate, annual GVA, annual median wages, annual local authority expenditure, and separate time trends by quintile of deprivation and government office region.

2. Lead models.

Table 27. Additional percentage of the population experiencing reassessment *in current time period* associated with an increase of 1 suicide, 1000 cases of self reported mental health problems or 1000 antidepressants prescribed per 100,000 in *the previous time period* (Antidepressants and self reported mental health problems – previous quarter, suicides – previous year).

	Percentage point increase	95% CI		p
Items of antidepressants	0.0031	-0.0056	0.0118	0.4867
Mental health problems	0.0013	-0.0008	0.0034	0.2194
Suicides	-0.0003	-0.0039	0.0032	0.8618

Note : Models included controls for local authority fixed effects, time trends 2004 to 2006 and 2007 to 2013, season, quarterly unemployment rate, annual GVA, annual median wages, annual local authority expenditure, and separate time trends by quintile of deprivation and government office region.

3. Multilevel logistic regression model.

To check whether the association of the reassessment rate with increases in self reported mental health problems, was influenced by changes in the composition of the population we estimated a multilevel model with the reassessment rate at the local authority level along with the quarterly unemployment rate, annual GVA, annual median wages, annual local authority expenditure and local authority fixed effects, as well as a number of individual level control variables including age and sex, labour market status (employed, unemployed and inactive), number of physical chronic illnesses and educational status. The model also included, interactions between sex and age, sex and labour market status, sex and educational status and sex and number of physical comorbidities as these had differential effects by gender group.

Table 28. Increase in self reported mental health problems associated with each additional 10,000 people in an area experiencing reassessment. – multilevel model.

	Result	95% CI		p
Relative increase - Odds ratio.	1.05	1.03	1.07	<0.001
Absolute marginal increase.	2194	1291	3096	<0.001

4. Alternative adjustments for time trends.

In our main model we included data from 2004 in order to take into account trends in our outcomes prior to the implementation of the reassessment process. This is because preexisting trends could act as confounders, for example if trends in suicides were already increasing at a greater rate in areas of the country where the reassessment process proceeded more rapidly this may appear to be the result of the reassessment process if data prior to 2010 was not included. We allow time

trends to vary before and after the economic crisis. This is because we know that declining trends in some mental health outcomes such as suicides reversed with the onset of the financial crisis. As there are potentially unobserved confounding factors that had differential trends across regions of the country before and after the recession we allowed underlying trends in mental health outcomes to vary by region and level of area deprivation. In a sensitivity analysis we estimate 3 additional models with simpler time trend structures finding that these tended to result in larger effect sizes, indicating that our preferred model is more conservative and potentially accounts for some unobserved confounders that follow similar time trends.

Model 1. Underlying time trends are assumed not to vary before and after the economic crisis – i.e this model does not include a marginal spline for the 2007-2013 period. i.e

$$\text{MHOUTCOME}_{i,t} = \beta_1 \text{REASSESS}_{i,t} + \beta_2 \text{UNEMP}_{i,t} + \beta_3 \text{MEDWAGE}_{i,t} + \beta_4 \text{GVA}_{i,t} + \beta_5 \text{LAEXPRATE}_{i,t} + \text{TIME} + \beta_6 \text{IMDQ}_i \times \text{TIME} + \beta_7 \text{GOR}_i \times \text{TIME} + \beta_8 \text{IMDQ}_i + \text{CONS} + \mu_i + \varepsilon_{i,t}$$

Where TIME is a linear trend term, other variable names are as in Appendix 3.

Model 2. Underlying time trends are assumed not to vary before and after the economic crisis AND not to vary across levels of deprivation or regions. i.e

$$\text{MHOUTCOME}_{i,t} = \beta_1 \text{REASSESS}_{i,t} + \beta_2 \text{UNEMP}_{i,t} + \beta_3 \text{MEDWAGE}_{i,t} + \beta_4 \text{GVA}_{i,t} + \beta_5 \text{LAEXPRATE}_{i,t} + \text{TIME} + \text{CONS} + \mu_i + \varepsilon_{i,t}$$

Model 3. The final model was the same as model 2, but was limited to data from 2010 onwards.

The association between the reassessment rate and each of the mental health outcomes estimated from each of these models are given in Table 29.

Table 29. Additional adverse mental health outcomes associated with each 10,000 people in an area experiencing reassessment estimates with simpler time trend structures (note the antidepressant data was only available from 2010 therefore only model 3 can be estimated)

Outcome	Model			
Suicides		Number	95% CI	p
Model 1		7	4 10	<0.001
Model 2		5	2 7	<0.001
Model 3		7	2 12	0.01
Mental health problems				
Model 1		3482	1566 5398	<0.001
Model 2		3985	2322 5648	<0.001
Model 3		3808	334 7281	0.03
Antidepressants				
Model 3		9291	6882 11700	<0.001

5. Models with alternative groups and outcomes.

To investigate if the association identified in our study was specific to mental health problems in the working age population we repeated the analysis using outcomes we would not expect to be influenced by the reassessment policy. Shadish et al.²⁰³ refer to this as using Nonequivalent Dependent Variables (NDV) i.e those outcomes that should *not* be influenced by a change in the exposure but that could be influenced along with the outcome by unobserved confounding factors. Finding no effect on these outcomes can enhance the validity of observational analysis.²⁰³ We identified four Nonequivalent Dependent Variables in each of our datasets. Using the Quarterly Labour Force Survey we use the quarterly prevalence of mental health problems in the population over 65 years old and the prevalence of reported Heart, blood pressure & circulation problems in the working age population. Heart, blood

pressure & circulation problems were selected as an NDV because it is unlikely that the reassessment process would increase the prevalence of these and this is the largest category of health problems reported in the QLFS. Therefore repeating our analysis with this outcome provides the greatest power to detect any associations. Heart, blood pressure & circulation problems are likely to be affected by other factors that could act as confounders or artifacts in our analysis, such as changes to survey design, changes in the propensity of people to report health problems, changes in access to healthcare, trends in physical health or other confounding factors that are associated with the reassessment rate and trends in this health outcomes. Similarly we investigated whether there was any association between the reassessment rate and trends in the rate of prescribing for cardiovascular conditions (BNF chapter 2). Finally we used data on suicides in over 65 year olds per 100,000 populations as an NDV. This outcome would be sensitive to any changes in the way that suicides are recorded as well as confounding factors that affect suicide risk across all age groups, which could have influenced our results. We find that the reassessment rate is not significantly associated with any of these Nonequivalent Dependent Variables (see Table 30) indicating that it is unlikely that the association that we find between the reassessment rate and trends in adverse mental health outcomes was due to confounding factors or artifacts that would also affect these Nonequivalent Dependent Variables.

Table 30. Increase (- decrease) in Nonequivalent Dependent Variables associated with each 10,000 people in an area experiencing reassessment.

	Number	95% CI		p
Items of Cardiovascular drugs prescribed	9644	-4870	24157	0.2
Heart, blood pressure & circulation problems	-1199	-3935	1537	0.4
Mental health problems in over 65 year olds	-1945	-5406	1516	0.3
Suicides in over 65 year olds	3	-2	8	0.2
Note : Models for Items of Cardiovascular drugs, Heart, blood pressure & circulation problems and Suicides in over 65 year olds. Model for Mental health problems in over 65 year olds based on multilevel logistic regression as outlined in appendix 4 section 3.				

5.5 Appendix. - Investigating variation in reassessment trends.

To make causal inferences about the association between the reassessment rate and trends in adverse mental health outcomes, we need to assume that the variation in local trends in the reassessment rate conditional on other covariates in our model was not associated with other causes of trends in mental health outcomes during this time. In other words we assume that the variation is as good as random. There are a number of factors that might account for variation in trends in the reassessment rate across local areas. Firstly there is the targeting of the programme at more deprived areas and regions with higher levels of people on Incapacity Benefits, secondly there are logistical, human resource and planning considerations that affect variation in implementation of any large-scale operation. The first of these we control for by including fixed (local authority) effects in the model and separate times trends by area deprivation and region. The remaining variation is therefore likely to be due to these logistical, human resource and planning considerations. We know that there was considerable variation in the implementation process, with some assessment centres progressing at a slower rate than others – leading to a large backlog of claims at some centres. Reports of the reasons for this variation include, technical problems, under estimates of referral

rates and the time involved in carrying out assessments when planning resources and problems with recruiting staff^{63–66,310}.

To further investigate this variation in reassessment rates we estimate a fixed effects regression model with reassessment trends as the outcome, including the main variables used in the analysis. See Table 31. We can see that the reassessment progressed at a faster rate in the North East and North West, in more deprived areas than in more affluent areas, the trend in reassessment was also negatively associated with trends in unemployment, and positively associated with trends in wages and local government expenditure. This indicates that it was necessary to control for these trends in our analysis to reduce possible sources of bias.

Table 31. Regression model showing association between main control variables and the reassessment rate (people reassessed per 100,000 population).

Variable	Coefficient	95% CI	P
Quarter	100.54	[83.30,117.78]	<0.001
Season 1	0	[0.00,0.00]	.
Season 2	-100.12	[-113.69,-86.54]	<0.001
Season 3	-75.9	[-92.41,-59.38]	<0.001
Season 4	-86.3	[-103.32,-69.28]	<0.001
UNEMP	-578.92	[-622.98,-534.86]	<0.001
GVA	-11.01	[-20.16,-1.85]	0.0187
MEDWAGE	-176.75	[-340.43,-13.06]	0.0345
EXPRATE	-504.96	[-1006.19,-3.72]	0.0483
Quintiles of deprivation.			
1.IMDQ#Quarter	0	[0.00,0.00]	.
2.IMDQ#Quarter	34.39	[23.07,45.70]	<0.001
3.IMDQ#Quarter	62.21	[48.60,75.83]	<0.001
4.IMDQ#Quarter	89.77	[75.13,104.41]	<0.001
5.IMDQ#Quarter	122.06	[106.14,137.99]	<0.001
Regions			
East Midlands#Quarter	0	[0.00,0.00]	.
East of England#Quarter	-17.19	[-35.38,0.99]	0.0636
London#Quarter	-41.08	[-60.78,-21.39]	0.0001
North East#Quarter	72.09	[29.69,114.49]	0.001
North West#Quarter	45.95	[27.17,64.73]	<0.001
South East#Quarter	-17.86	[-36.85,1.12]	0.065
South West#Quarter	7.29	[-13.01,27.58]	0.479
West Midlands#Quarter	-30.78	[-53.56,-8.00]	0.0084
Yorkshire and the Humber#Quarter	13.7	[-9.73,37.14]	0.2496
CONS	3672.2	[3034.84,4309.56]	<0.001
N (LA years)	5800		
r ²	0.78		

We further investigated whether trends in the reassessment rate were additionally associated with trends in initial reassessment rates for Employment Support Allowance in each area and whether the level of rurality in a local authority area influenced the trend in reassessments. It is possible that as the same organisation (Atos) was carrying out initial assessments during this time high demand of initial assessments in an area may have reduced the rate at which the reassessment

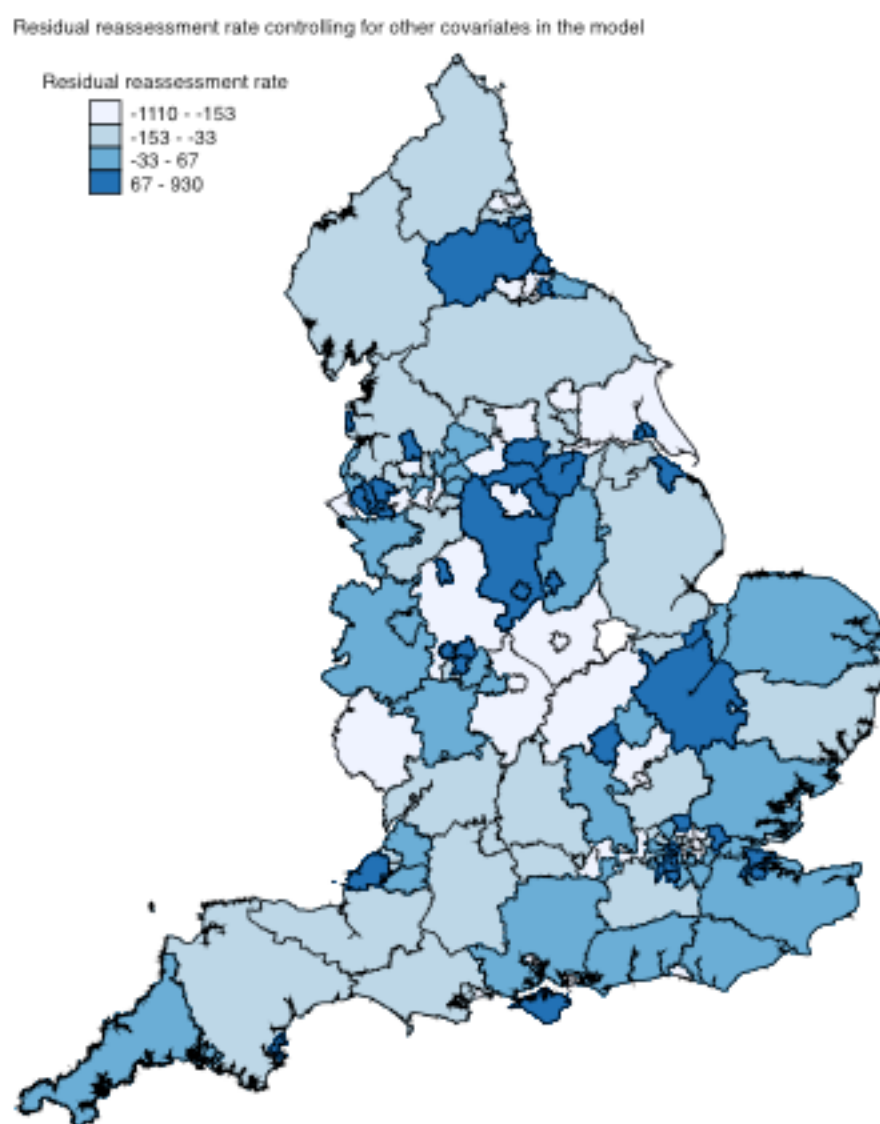
programme progressed, it is also possible that logistical constraints on the programme were greater in more rural areas with more dispersed populations. We divided the local authorities into 5 groups based on the proportion of the population in each LA that was living in a rural area according to Office for National Statistics rural/urban classifications and added interaction terms between level of rurality and time into the model. Regional quarterly caseloads of initial assessments for ESA as a percentage of the working age population were used to assess trends in initial assessment rates. Adding these terms to the model indicated that there was no significant difference in trends in reassessment between more rural or more urban areas, when other covariates were taken into account. However the trend in reassessments was significantly negatively associated with the trend in initial reassessment in an area i.e the reassessment process tended to proceed at a slower rate in areas where there was a greater increase in initial assessments.

Table 32. Coefficients from regression model showing trends in reassessment rate by level of rurality and association between the reassessment rate and initial assessment rate in each LA . 1.RURAL – least rural quintile to 5.RURAL most rural.

Quintiles of rurality.	Coefficient	95% CI	P
1.RURAL#Quarter	0	[0.00,0.00]	.
2. RURAL#Quarter	7.95	[-8.74,24.64]	0.3483
3. RURAL#Quarter	-3.1	[-19.66,13.45]	0.7116
4. RURAL#Quarter	16.16	[-5.76,38.07]	0.1473
5. RURAL#Quarter	18.31	[-5.40,42.01]	0.1291
Initial reassessment rate.	-1.21	[-1.43,-0.99]	<0.001

To investigate the geographical pattern of the variation in the reassessment rate that was not explained by our control variables we have mapped the average residuals for each local authority area from the model above (see Figure below). This indicates the variation in the reassessment rate after accounting for the control variables in our model. There is no obvious spatial pattern to this variation, supporting the assumption that it is approximately random.

Figure 35. Average residuals from model of reassessment rates by local authority area.



We finally assessed whether including regional trends in initial ESA assessments and separate trends by level of rurality in our model for mental health outcomes affected our results. Local trends in initial assessments for ESA and separate trends by level of rurality were not significantly associated with local trends in any of our mental health outcomes and adding the term to our main models did not change the association between the reassessment rate and the mental health outcomes. (see Table 33 and 34)

Table 33. Additional adverse mental health outcomes associated with each 10,000 people in an area experiencing reassessment – additionally controlling for trends in initial assessments for ESA.

	Number	95% CI		p
Suicides	6	2	10	0.001
Cases of mental health problems	2270	46	4495	0.045
Items of antidepressants	7002	3898	10106	<0.001

Table 34. Additional adverse mental health outcomes associated with each 10,000 people in an area experiencing reassessment – additionally controlling for separate trends by level of rurality.

	Number	95% CI		p
Suicides	6	2	9	<0.001
Cases of mental health problems	6708	3762	9653	<0.001
Items of antidepressants	2703	599	4807	<0.001

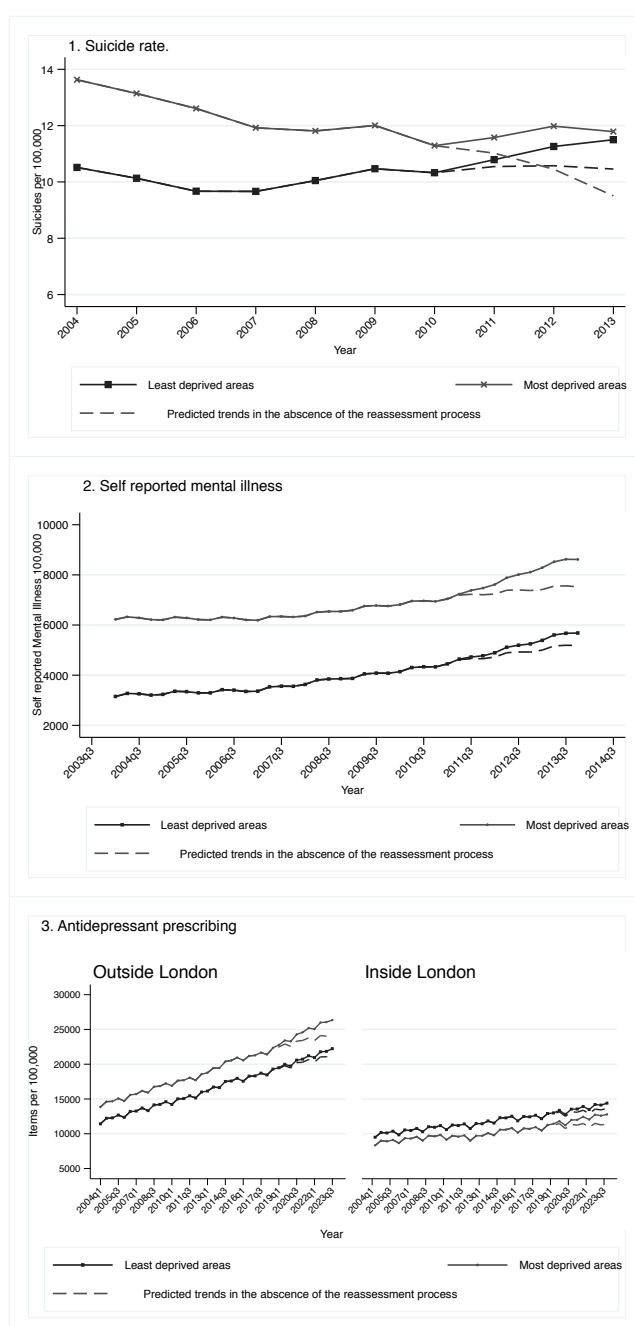
5.6 Appendix. - Predicted trends in mental health outcomes in the presence and absence of the reassessment policy by level of area deprivation.

We used our regression models to estimate how the predicted trends of our mental health outcomes would have differed in the absence of the reassessment policy compared to trends in the presence of the policy. To assess the potential impact on health inequalities, we investigated whether the association between the reassessment rate and the mental health outcomes varied by level of baseline deprivation by testing interactions between these variables, and estimated the trends in the most affluent and most deprived parts of the country based on the upper and lower quintiles of area deprivation (IMD). As the relationship between deprivation and antidepressant prescribing is very different within London as compared to areas outside London²⁷¹ we presented results for antidepressant prescribing separately for these areas.

Figure 36 shows the estimated trends in each mental health outcome in the most deprived and least deprived areas of England and the predicted trend that would have been expected from the regression models if these 1.03 million people had not been through this reassessment process. There was no significant interaction between the reassessment rate and area deprivation, i.e the same level of increase in the reassessment rate was associated with the same impact in deprived areas as in more affluent areas. However as more disadvantaged socioeconomic groups are more likely to be in receipt of disability benefits, and thus to be assessed, the reassessment policy was associated with a greater increase in these adverse mental health outcomes in more deprived areas. Our analysis shows that the gap in the suicide rate and to a lesser extent self reported mental health problems between the least deprived and most deprived areas had been declining prior to the introduction of the reassessment policy, however after the policy this trend reverses.

This suggests that there would have been a further narrowing of these inequalities in the absence of the reassessment process.

Figure 36. The estimated trend in suicides, mental health problems and antidepressant prescribing in the most deprived and least deprived local authorities areas in England, dashed lines show the predicted trend in the absence of the reassessment policy, 2004 to 2013.



6 Appendices for Chapter 7 – Study 5.

6.1 Appendix. - Major disability benefit changes in countries included in study

Table 35. Major disability benefit changes in countries included in study

Country	Major Reforms of Disability/ Sickness Benefits
Canada	<p>1973- Benefits in the QPP programme increased by \$50(CAD).[1]</p> <p>1984 -QPP introduced early retirement option.[1]</p> <p>1987- CPP doubled the value of the flat-rate component of the benefit to a level equal to that paid by the QPP, relaxed the contributory eligibility rule and introduced early retirement option. [2-3]</p> <p>1989 – CPP policy directive allowing non medical factors such as the regional unemployment rate to be taken into account when assessing claims.[3]</p> <p>1992- CPP allowed for retrospective claims for benefits to be determined some time after the date of onset of disability.</p> <p>1993- QPP changed their requirement for being unable to work from “any job” to “usual job” and relaxed contribution requirements.</p> <p>1995- A more stringent set of medical adjudication guidelines adopted in the CPP.</p> <p>1995-A reversal of previous policy in the CPP allowing non medical factors such as the regional unemployment rate to be taken into account when assessing claims.</p> <p>1995 –CPP Expands work test requirements to include 55-64 year olds.</p> <p>1998-CPP changes contribution requirements and increases number of years of earnings used to calculate earnings related portion of benefit.</p>
UK	<p>1971 – Invalidity Pension and Invalidity Allowance (together known as Invalidity Benefits (IVB) contribution-based, income-replacement benefit introduced.</p> <p>1975 – Introduction of Non-Contributory Invalidity Pension (NCIP) at lower rate than IVB (housewives ineligible)</p> <p>1984 – NCIP replaced with Severe Disablement Allowance.</p> <p>1980- Invalidity Benefits linked to prices rather than being up-rated with earnings as they had been previously.</p> <p>1986 – Income Support replaces Supplementary Benefit and includes extra cost Disability Premium[4]</p> <p>1995- Incapacity for Work Act replaces IVB with Incapacity Benefit (IB). IB was not available to people over state pension age, eligibility conditions were tighter, those claiming IB no longer</p>

	<p>received an additional pension based on earnings history, as a result the benefit level for older workers reduced by about 37%[5]</p> <p>1999- Contribution conditions modified, additional information required on ability to work, income from private pensions taken into account in assessing amount of benefit to be paid out.</p> <p>2001 –Severe Disablement Allowance closed to new claims.</p> <p>2008- Welfare Reform Act replaces IB with Employment Support Allowance for new claimants, this includes a more stringent work capability assessment and two-tier benefit with those deemed to be capable of work related activity receiving lower benefits than those judged unable to work conditional upon them undertaking work-related activity. [6]</p>
Sweden	<p>1987-Increase in sickness benefit replacement rate to 90% of earnings for all claims</p> <p>1991-Reduction in sickness benefit level to 75% in the first three days.</p> <p>1992 -Reduction in sickness benefit level to 80% after day 90.</p> <p>1993- Reduction in sickness benefit level to 70% after the first year.</p> <p>Second half of the 1990s compensation rates increased again, offering 90% until the end of the first year and 80% thereafter.</p> <p>1995-Tougher rules for sickness certification introduced</p> <p>1997- Policy change in the disability insurance scheme, which abolished favourable treatment for over 60 year olds, introducing the requirement to change occupation or residence to find suitable job as well as a more stringent medical test and the requirement to engage in rehabilitation.</p> <p>1998 - A policy change in the sickness insurance programme that allowed blue collar workers and municipal workers to claim an additional 10% of wages through compensation from collective agreements on top of the national insurance payments, after 90 days of sickness absence.</p> <p>2003-Sickness and disability benefits merged: claimants aged under-30 receive ‘activity compensation’ only paid for a maximum of three years, over-30s receive ‘sickness compensation’ that can be permanent</p> <p>2007- New guidelines introduced for granting sick leave certificates by GPs</p> <p>2008- Reduction in sickness benefit to 80% of prior earnings for the first year, 75% for the second year payable for a maximum of 550 days. [7-11]</p>
Norway	<p>1988- The introduction of a medical Certificate system at 8 weeks of sickness absence.[12]</p> <p>1993- Second medical reassessment introduced at 12 weeks</p> <p>1970’s-1980’s-On average, replacement rates for disability pension rose in the late 1970s and were unchanged or declined</p>

	<p>slightly during the 1980s.[13]</p> <p>1991- Eligibility criteria for disability pension tightened and level of benefit reduced [12, 14]</p> <p>1998- Minimum disability pension increased by 10%, age limit raised from 16 to 18 years old medical requirements sharpened for young disabled[15]</p> <p>2000- Requirement for having gone through rehabilitation increased[15]</p> <p>2004- Introduction of temporary disability benefit, and stricter evaluation of the functional capacity of the people on sick leave, including sanctions on GPs who do not comply with the new rules.</p>
Denmark	<p>Prior to 2003- Disability benefit level depended on the degree of disability, family status and age.</p> <p>2003 - A new disability pension scheme consolidated this scheme into one benefit payable at a flat rate which is around half of the gross average wage. The partial benefit for partial disability was abolished altogether. The reform also included a change in the assessment criterion so that a person is now assessed as to whether they can support themselves through any work including a subsidised flex-job.</p> <p>2005 - New medical certificates for sickness certification were introduced with a focus on the person's ability to function (certificates remain non-statutory)[16].</p>

6.2 Appendix. - Summary of search strategy

Table 36. Study 4. Search terms.

Policy	(change/difference/reform/eligib*/uneligib*/qualify*/entitl*/generosity/screen*/ condition* AND /benefit*/insurance/income replacement/pension*/compensation/welfare/social security),
Population	(sickness/disab*/chronic/injur*/accident/illness/)
Outcome	Labour/labor /work/force/involve*/participat*/unemployment/employment).

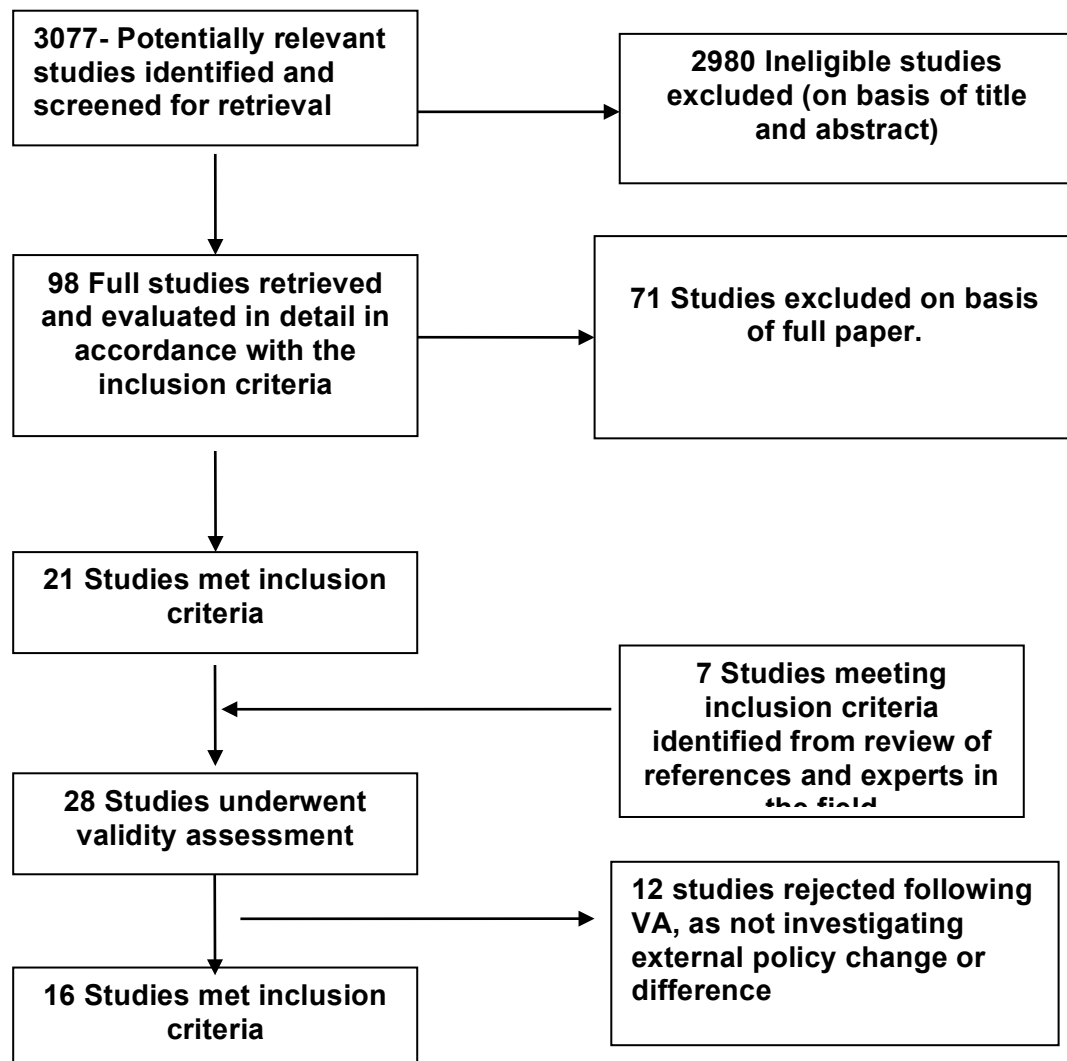
Table 37. Study 4.Databases searched.

British Humanities index BHI
MEDLINE
Scopus Business and Economics
Scopus natural sciences
Sociological Abstracts
International Bibliography of the Social Sciences
Database of Abstracts of Reviews of Effects
Cochrane database for systematic reviews
Social Sciences Index
Proquest dissertations and thesis
Econpapers
System for Information on Grey Literature in Europe Archive
Web of Science

Table 38. Study 4. Websites searched

International Labour Organisations- www.ilo.org
OECD- www.oecd.org
Department for Work and Pensions- www.dwp.gov.uk
Her Majesties Revenue and Customs- www.hmrc.gov.uk
Institute for Fiscal Studies- www.ifs.org.uk
National Institute for Economic and Social Research- www.niesr.ac.uk
The Institute for Employment Studies- www.employment-studies.co.uk
Centre for Economic Policy Research - www.cepr.org
Danish National Centre for Social Research- www.sfi.dk
Stockholm University's Department of Economics Working papers- www.ne.su.se/research/workingpapers
Sweden's National Institute of Economic Research- http://www.konj.se
The Institute for Labour Market Policy Evaluation- www.ifau.se

Figure 37. Study 4. Flow chart for searches and study selection



6.3 Appendix. - Validity Assessment

Criteria	Rationale	Score
Unit of analysis	There were three types of analysis units used in the studies, aggregate (ecological), individual or repeated measures on the same individuals (panel). Panel data was seen as being the most robust as it allows for unmeasured confounding factors to be accounted for where these do not vary within individuals over time. Ecological studies were seen at the least robust as ecological bias can occur where aggregate data are used to make inferences about individuals.[17]	3- Longitudinal (panel) data 2-Individual data 1-Ecological (aggregate data)
Comparison approach	Studies either compared cross sectional differences in disability benefits, changes over time or a combination of both using a difference in differences approach. Cross sectional comparisons will be particularly susceptible to unmeasured sources of confounding. Studies that look at changes in the same group over time will overcome this to a certain extent; however the results will be at risk of being influenced by other secular trends. The most robust approach will be where a policy has changed over time for one group and this is compared with another group that is unaffected by the change (a difference in differences approach).	3-Difference in Differences 2-Interrupted time series 1-Cross sectional
Selection and response bias	Studies either used: (1) nationally recognised surveys based on random sampling, (2) non-random but representative data, for example administrative data from a scheme with universal coverage, or (3) a non random sample not representative of the rest of the population such as administrative data from a scheme without universal coverage.	3- Nationally recognised survey, based on random sampling 2-Non random sample that it is representative 1- Non random sample that is not representative
Confounding	Whether potential confounders were adequately adjusted for in the analysis (Age, Sex, Health status, Labour market conditions, wage, education or occupation.)	3- All major confounders included in analysis 2-Missing 1-2 confounders 1-missing >2 confounders
Analysis	The likelihood of the analysis resulting in biased estimates was assessed. This included looking at the sample size and whether an appropriate statistical technique had been used. In particular several studies had not adequately adjusted for the spatial clustering and serial correlation in the data.	3- large sample size and an appropriate statistical technique was used 2-Either an inappropriate statistical technique was used or the sample size was small. 1.-Both an inappropriate statistical technique was used and the sample was small.

7 Appendices for Chapter 8 – Study 6.

7.1 Appendix. - The Work capability Assessment.

The assessment is used to classify claimants into three groups, those who are fit for work and not eligible for these disability benefits, those who are eligible but expected to prepare for a return to work at some point, and those with the most severe impairments who are not obliged to undertake any work-related activity.

Table 39. Activities assessed in the WCA indicating the highest (15 points) descriptor and lowest scoring (6 points) in each category, claimants scoring less than 15 points are judged to be fit-for-work.

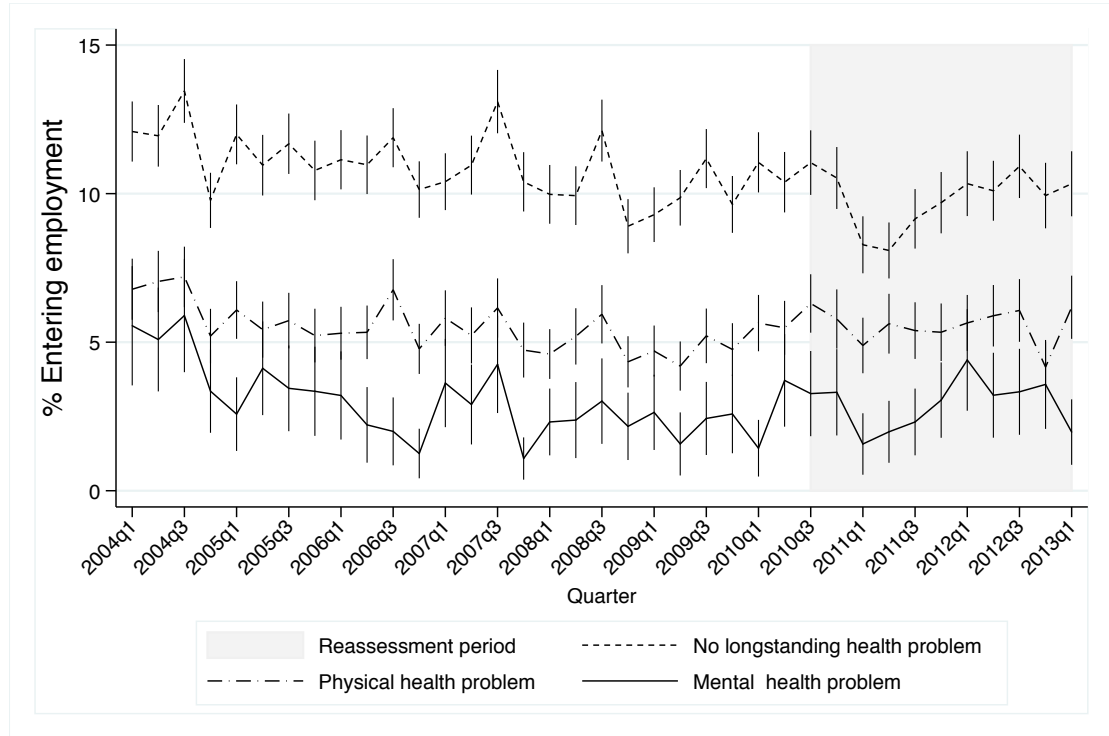
Activity area	Examples of descriptors	
	Highest scoring – 15 points	Lowest scoring – 6 points
Mobilising.	Cannot mobilise more than 50 metres on level ground without stopping in order to avoid significant discomfort or exhaustion;	Cannot mobilise more than 200 metres on level ground without stopping in order to avoid significant discomfort or exhaustion
Getting about	Cannot get to any place outside the claimant's home with which the claimant is familiar.	Is unable to get to a specified place with which the claimant is unfamiliar without being accompanied by another person.
Navigating	Unable to navigate around familiar surroundings, without being accompanied by another person, due to sensory impairment.	Unable to navigate around unfamiliar surroundings, without being accompanied by another person, due to sensory impairment
Sitting and standing	Cannot move between one seated position and another seated position located next to one another without receiving physical assistance from another person.	Cannot, for the majority of the time, remain at a work station for more than an hour, before needing to move away in order to avoid significant discomfort or exhaustion.
Reaching	Cannot raise either arm as if to put something in the top pocket of a coat or jacket.	Cannot raise either arm above head height as if to reach for something.
Picking up and moving objects	Cannot pick up and move a 0.5 litre carton full of liquid.	Cannot transfer a light but bulky object such as an empty cardboard box.

Manual dexterity	Cannot either press a button, such as a telephone keypad; or turn the pages of a book with either hand.	Cannot single-handedly use a suitable keyboard or mouse.
Awareness of hazards	Reduced awareness of everyday hazards leads to a significant risk of: (i) injury to self or others; or (ii) damage to property or possessions.	Reduced awareness of everyday hazards leads to a significant risk of: (i) injury to self or others; or (ii) damage to property or possessions such that they occasionally require supervision to maintain safety.
Consciousness	At least once a week, has an involuntary episode of lost or altered consciousness resulting in significantly disrupted awareness or concentration.	At least once a month, has an involuntary episode of lost or altered consciousness resulting in significantly disrupted awareness or concentration
Bladder/bowel continence	At least once a month experiences: loss of control leading to extensive evacuation of the bowel and/or voiding of the bladder.	The majority of the time is at risk of loss of control leading to extensive evacuation of the bowel and/or voiding of the bladder, sufficient to require cleaning and a change in clothing, if not able to reach a toilet quickly.
Understanding communication	Cannot understand a simple message due to sensory impairment, such as the location of a fire escape.	Has some difficulty understanding a simple message from a stranger due to sensory impairment.
Making self understood	Cannot convey a simple message, such as the presence of a hazard.	Has some difficulty conveying a simple message to strangers.
Social interaction	Engagement in social contact is always precluded due to difficulty relating to others or significant distress experienced by the individual.	Engagement in social contact with someone unfamiliar to the claimant is not possible for the majority of the time due to difficulty relating to others or significant distress experienced by the individual.
Initiating & completing personal action	Cannot, due to impaired mental function, reliably initiate or complete at least 2 sequential personal actions.	Frequently cannot, due to impaired mental function, reliably initiate or complete at least 2 personal actions.

Coping with change	Cannot cope with any change to the extent that day to day life cannot be managed.	Cannot cope with minor unplanned change (such as the timing of an appointment on the day it is due to occur), to the extent that overall, day to day
Appropriateness of behaviour	Has, on a daily basis, uncontrollable episodes of aggressive or disinhibited behaviour that would be unreasonable in any workplace.	Occasionally has uncontrollable episodes of aggressive or disinhibited behaviour that would be unreasonable in any workplace.
Learning tasks	Cannot learn how to complete a simple task, such as setting an alarm clock.	Cannot learn anything beyond a moderately complex task, such as the steps involved in operating a washing machine to clean clothes.

7.2 Appendix. - Trend in transitions into the labour market by main health condition.

Figure 38. The percentage of working age people (18-64) with and without a longstanding health problem entering employment each quarter, from the second quarter of 2004 to the first quarter of 2013.



7.3 Appendix. - Model formulae and full model results.

Complimentary log-log models and multinomial logit models.

We use discrete time hazard models as demonstrated by Capellari ³⁷¹ for investigating factors associated with labour market transitions in the UK QLFS panel data. Alison and Jenkins ^{199,409} have outlined how widely used regression models for binary outcomes (logistic, complementary log-log) can be used to estimate the probability of leaving a state, conditional on the duration that the respondent has been in that state. ¹⁹⁹ The complementary log-log model specification leads to a discrete time representation of the continuous time proportional hazards model. We use this for modeling the binary transition from non-employment into employment – i.e. a single-risk model. The model formula is therefore:

$$h(x) = 1 - \exp[-\exp(\beta_1 X_{ikt} + \beta_2 Z_{kt} + \beta_3 YEAR + \beta_4 SEASON + \gamma)]$$

Where $h(x)$ is the hazard rate – the probability of entering employment at time t conditional on having been out of employment for t quarters. The parameter γ characterizes the baseline hazard modeled in this case the log of t . X is a vector of individual controls for individual i in local authority k at time t (age, sex, education). Z is a vector of area based controls for local authority k (Area deprivation, baseline level of disability benefit receipt, government office region). Year and Season are sets of dummy variable indicating year and season.

The multinomial logit model has frequently been used as a generalisation of this dichotomous case to model transition to multiple destinations.²⁰² We use this to model transitions from unemployment into either employment or inactivity, and from inactivity into either employment or unemployment – i.e. a competing risks model. In this case the hazard of transition into a particular state (j) rather than other/alternative states, say p , is given by:

$$h(j,x) = \frac{[\exp(\beta_{1j}X_{ikt} + \beta_{2j}Z_{kt} + \beta_{3j}YEAR + \beta_{4j}SEASON + \gamma_j)]}{[1 + \sum_{p=1}^j \exp(\beta_{1p}X_{ikt} + \beta_{2p}Z_{kt} + \beta_{3p}YEAR + \beta_{4p}SEASON + \gamma_p)]}$$

As we only have a short 5 quarter panel for each individual, we do not have observations for the full duration of the time they are out-of-work. As pointed out by Capellari (2005) this means that only transitions for those individuals who have remained workless up to the point of first appearing in the data can be observed. This does not pose any problems so long as the length of the spell is known^{199,371,410}. In our analysis, this is taken as the time since last employment or for those individuals with no previous employment the time since they were aged 18.

In these models a functional form needs to be chosen for the baseline hazard rate. This characterizes the duration dependence, in other words how the probability of

leaving a state (e.g unemployment) changes the longer a person is in that state. In keeping with other analysis of labour market transitions we model duration dependence as the log of time since last employment. We investigate whether this is a reasonable assumption by comparing this to a model with a non-parametric function that includes a dummy variable for each time period. As shown below:

Figure 39. Comparing baseline duration dependence of baseline hazard based on log of time out-of-work, versus non-parametric (dummy variable) model. – all transitions from non-employment to employment.

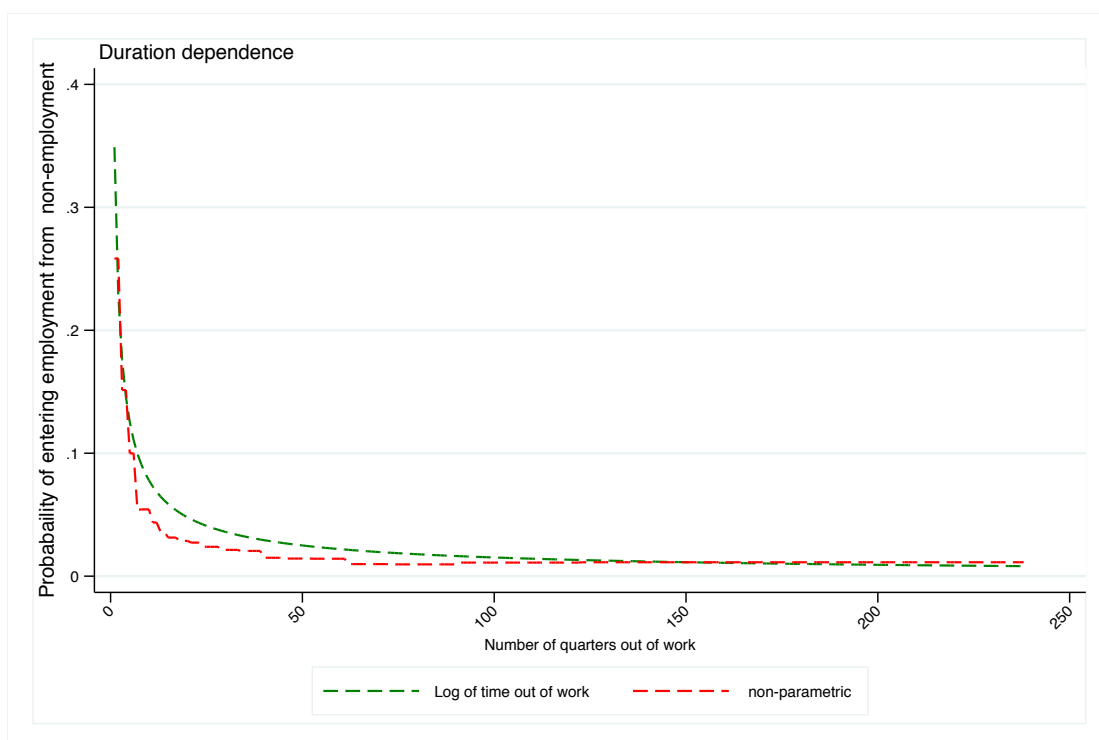


Figure 39 indicate that modelling duration dependence, as the log of time out-of-work, is reasonable.

Table 40. Complementary log-log model– Hazard ratios for transitions from non-employment and employment.

	Variable	HR	CI	p
Age	18-34	1	[1.00,1.00]	.
	35-50	1.11	[1.04,1.18]	0.0014
	50-64	0.54	[0.51,0.58]	0
Sex	Women	1	[1.00,1.00]	.
	Men	1.45	[1.38,1.53]	0
Education	High education	1	[1.00,1.00]	.
	Low education	0.76	[0.72,0.80]	0
	GVA	1.01	[0.99,1.03]	0.4448
	Baseline receipt of out of work disability benefits (% of working age population)	0.94	[0.88,1.00]	0.0352
Health Status	No Longstanding health problem	1	[1.00,1.00]	.
	Physical health problem	0.73	[0.67,0.79]	0
	Mental health problem	0.42	[0.35,0.51]	0
Policy	Reassessment rate	1.01	[0.93,1.10]	0.7371
	No Longstanding health problem# Reassessment rate	1	[1.00,1.00]	.
	Physical health problem # Reassessment rate	0.96	[0.90,1.02]	0.2264
	Mental health problem# Reassessment rate	0.96	[0.84,1.11]	0.6247
Region	East Midlands	1	[1.00,1.00]	.
	East of England	0.99	[0.87,1.12]	0.8522
	London	0.9	[0.79,1.03]	0.1166
	North East	0.98	[0.84,1.15]	0.8266
	North West	1.01	[0.89,1.15]	0.8409
	South East	1.02	[0.91,1.15]	0.7129
	South West	1.03	[0.91,1.17]	0.6474
	West Midlands	0.88	[0.77,1.00]	0.0418
	Yorkshire and Humber	0.89	[0.78,1.02]	0.0921
Deprivation quintile	1. Least Deprived	1	[1.00,1.00]	.
	2	1.07	[0.98,1.17]	0.1464
	3	0.94	[0.83,1.06]	0.2929
	4	0.97	[0.83,1.14]	0.6956
	5. Most deprived	0.98	[0.82,1.18]	0.8561
	Models also controlled for year and season(output not shown).			
	N	102927		

Table 41. Multinomial logit model – Hazard ratios for transitions from unemployment into employment and inactivity.

		Transitions into employment			Transitions into inactivity		
	Variable	HR	CI	p	HR	CI	p
Age	18-34	1	[1.00,1.00]	.	1	[1.00,1.00]	.
	35-50	1.18	[1.08,1.28]	0.0002	1.28	[1.14,1.44]	0
	50-64	1.06	[0.96,1.17]	0.2685	1.89	[1.67,2.15]	0
Sex	Women	1	[1.00,1.00]	.	1	[1.00,1.00]	.
	Men	0.93	[0.87,1.01]	0.0831	0.54	[0.49,0.60]	0
Education	High education	1	[1.00,1.00]	.	1	[1.00,1.00]	.
	Low education	0.69	[0.64,0.75]	0	0.82	[0.74,0.90]	0.0001
	GVA	1.00	[1.00,1.00]	0.1959	1	[1.00,1.00]	0.3519
	Baseline receipt of out of work disability benefits (% of working age population)	0.93	[0.86,1.02]	0.1139	0.97	[0.87,1.08]	0.5645
Health Status	No Longstanding health problem	1	[1.00,1.00]	.	1	[1.00,1.00]	.
	Physical health problem	0.97	[0.87,1.08]	0.5286	1.32	[1.15,1.50]	0.0001
	Mental health problem	0.64	[0.49,0.83]	0.0009	1.54	[1.18,2.02]	0.0017
Policy	Reassessment rate	1.06	[0.95,1.19]	0.2923	0.99	[0.85,1.14]	0.8491
	No Longstanding health problem# Reassessment rate	1	[1.00,1.00]	.	1	[1.00,1.00]	.
	Physical health problem# Reassessment rate	0.95	[0.87,1.04]	0.2395	1.06	[0.95,1.18]	0.3051
	Mental health problem # Reassessment rate	0.91	[0.73,1.15]	0.4399	1.12	[0.91,1.37]	0.2812
Region	East Midlands	1	[1.00,1.00]	.	1	[1.00,1.00]	.
	East of England	1.11	[0.92,1.32]	0.2714	0.98	[0.78,1.24]	0.889
	London	0.8	[0.66,0.96]	0.02	1.07	[0.85,1.36]	0.5631
	North East	1.09	[0.87,1.35]	0.4565	1.15	[0.88,1.50]	0.3021
	North West	1.1	[0.92,1.32]	0.3127	1.1	[0.88,1.39]	0.4053
	South East	1.14	[0.95,1.35]	0.1516	1.17	[0.94,1.46]	0.1631
	South West	1.16	[0.96,1.40]	0.1154	1.15	[0.91,1.46]	0.2364
	West Midlands	0.9	[0.75,1.08]	0.2537	0.86	[0.68,1.09]	0.2068
	Yorkshire and Humber	0.95	[0.79,1.15]	0.6184	1.09	[0.86,1.39]	0.4613
Deprivation quintile	1. Least Deprived	1	[1.00,1.00]	.	1	[1.00,1.00]	.
	2	1.00	[0.88,1.14]	0.9671	1.05	[0.88,1.24]	0.5992
	3	0.87	[0.73,1.04]	0.1172	1.00	[0.80,1.24]	0.9855
	4	0.88	[0.71,1.10]	0.2763	0.87	[0.65,1.17]	0.3533
	5. Most deprived	0.89	[0.69,1.14]	0.345	0.82	[0.59,1.14]	0.2346
	Models also controlled for year and season(output not shown).						
	N		21,705				

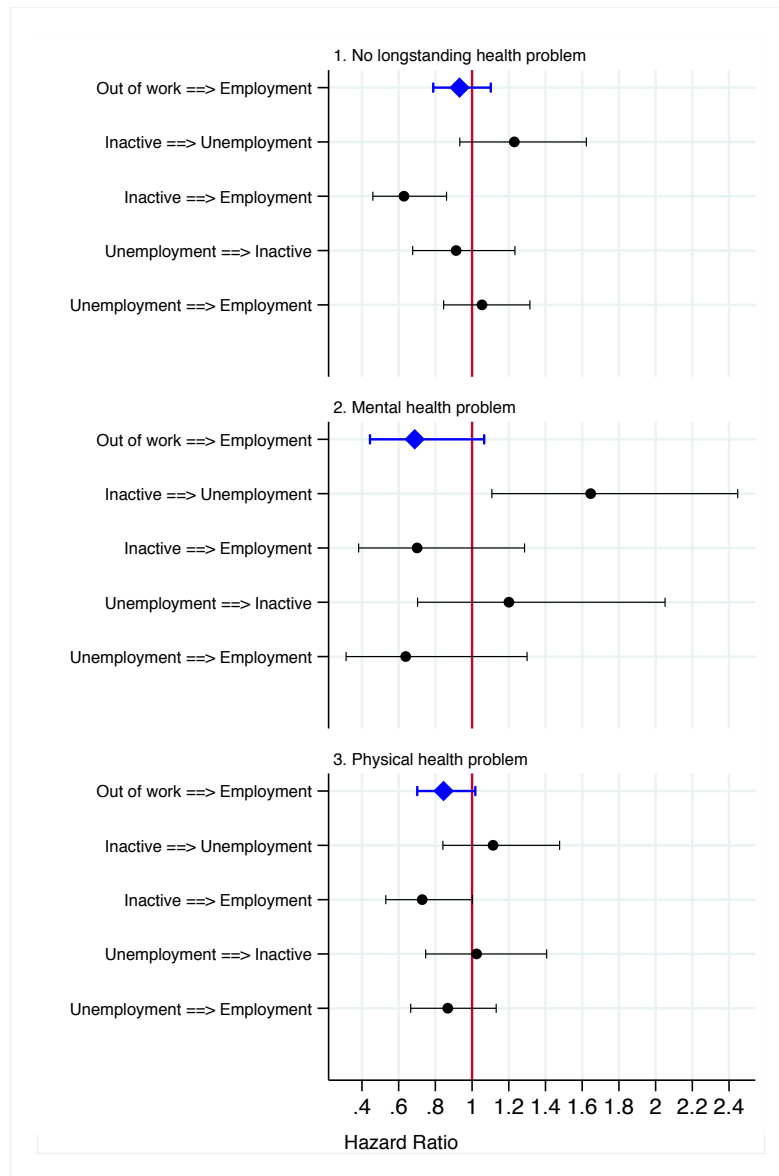
Table 42. Multinomial logit model – Hazard ratios for transitions from inactivity into employment and unemployment.

		Transitions into employment			Transitions into unemployment		
	Variable	HR	CI	p	HR	CI	p
Age	18-34	1	[1.00,1.00]	.	1	[1.00,1.00]	.
	35-50	1.34	[1.18,1.52]	0	1.03	[0.93,1.15]	0.5694
	50-64	0.65	[0.57,0.73]	0	0.31	[0.28,0.35]	0
Sex	Women	1	[1.00,1.00]	.	1	[1.00,1.00]	.
	Men	1.29	[1.17,1.43]	0	1.75	[1.58,1.93]	0
Education	High education	1	[1.00,1.00]	.	1	[1.00,1.00]	.
	Low education	0.73	[0.66,0.81]	0	1.06	[0.97,1.17]	0.2189
	GVA (£100/head)	1	[1.00,1.00]	0.5997	1	[1.00,1.00]	0.7196
	Baseline receipt of out of work disability benefits (% of working age population)	0.92	[0.83,1.03]	0.1427	1	[0.91,1.10]	0.9492
Health Status	No Longstanding health problem	1	[1.00,1.00]	.	1	[1.00,1.00]	.
	Physical health problem	0.61	[0.54,0.69]	0	0.64	[0.57,0.73]	0
	Mental health problem	0.35	[0.26,0.47]	0	0.6	[0.48,0.75]	0
Policy	Reassessment rate	0.87	[0.75,1.00]	0.0516	1.08	[0.94,1.24]	0.2811
	No Longstanding health problem# Reassessment rate	1	[1.00,1.00]	.	1	[1.00,1.00]	.
	Physical health problem# Reassessment rate	1.03	[0.92,1.15]	0.6264	1	[0.91,1.11]	0.926
	Mental health problem# Reassessment rate	1.14	[0.92,1.41]	0.232	1.13	[0.97,1.32]	0.119
Region	East Midlands	1	[1.00,1.00]	.	1	[1.00,1.00]	.
	East of England	0.84	[0.69,1.03]	0.1005	0.93	[0.76,1.13]	0.4538
	London	1.06	[0.86,1.31]	0.5907	0.84	[0.68,1.05]	0.1229
	North East	0.81	[0.61,1.08]	0.1475	0.77	[0.59,0.99]	0.0413
	North West	1	[0.81,1.23]	0.9776	0.79	[0.65,0.97]	0.0228
	South East	0.97	[0.79,1.18]	0.7273	0.91	[0.75,1.11]	0.3673
	South West	1.01	[0.83,1.23]	0.9141	0.74	[0.60,0.92]	0.0057
	West Midlands	0.82	[0.66,1.02]	0.0746	0.89	[0.73,1.08]	0.2338
	Yorkshire and Humber	0.87	[0.69,1.09]	0.2183	0.83	[0.67,1.04]	0.1006
Deprivation quintile	1. Least Deprived	1	[1.00,1.00]	.	1	[1.00,1.00]	.
	2	1.19	[1.03,1.38]	0.0192	1.03	[0.89,1.20]	0.6538
	3	0.98	[0.79,1.20]	0.8138	1.11	[0.92,1.34]	0.2896
	4	0.94	[0.71,1.25]	0.6727	1.03	[0.80,1.33]	0.8127
	5. Most deprived	0.92	[0.67,1.27]	0.6285	1.05	[0.78,1.41]	0.7394
	Models also controlled for year and season(output not shown).						
	N		81222				

7.4 Appendix. - Alternative analyses.

1. Lagged analysis.

Figure 40. Hazard Ratio (HR) indicating the change in the labour market transition probabilities associated with each additional 1% of the working age population experiencing reassessment in the area in the previous year.



2. Models adjusting for attrition.

To investigate attrition from the sample we fitted a complementary log-log model to the data with a variable indicating attrition as the outcome (i.e = 1 if the respondent left the panel at that wave 0 otherwise) and wave as the independent variable; in other words a discrete time survival model for attrition. From that we estimated the

hazard (i.e risk of leaving the panel conditional on having stayed in the panel to that point) and survival functions for attrition – see table 43 . This analysis indicates that 12% of respondents were lost to follow up in the second wave, with decreasing proportions following this. On average 8.3% of respondents dropped out between consecutive waves with 72% remaining for all 5 waves.

Table 43 The proportion leaving sample at each wave and proportion remaining in the sample.

Wave	Proportion leaving sample %	Proportion remaining in sample
1	0%	100%
2	12%	88%
3	7%	82%
4	7%	76%
5	6%	72%

We then added the other variables used in our analysis to this model to investigate which were associated with attrition from the panel (see table 44). From table 44 we can see that younger age groups, men, respondents with lower levels of education, respondents from London, and respondents from more deprived areas were more likely to drop out of the panel before reaching wave 5, However conditional on the other control variables included in our main analysis the reassessment rate was not significantly associated with attrition. This indicates that the level of attrition was not likely to bias our analysis.

Table 44. Hazard Ratios (HR) indicating the association between each variable and the chances that people dropped out of the panel (attrition) .

	Variable	HR	CI	p
Age	18-34	1	[1.00,1.00]	.
	35-50	0.71	[0.65,0.77]	<0.001
	50-64	0.92	[0.86,0.99]	0.031
Sex	Women	1	[1.00,1.00]	.
	Men	1.11	[1.05,1.18]	0.0001
Education	High education	1	[1.00,1.00]	.
	Low education	1.05	[0.99,1.12]	0.0758
	GVA	1	[1.00,1.00]	0.8058
	Baseline receipt of out of work disability benefits (% of working age population)	0.97	[0.91,1.04]	0.3845
Health Status	No Longstanding health problem	1	[1.00,1.00]	.
	Physical longstanding health problem	0.93	[0.88,0.99]	0.0202
	Mental health problem	0.94	[0.84,1.05]	0.2545
Policy	Reassessment rate	1.02	[0.89,1.16]	0.8052
Region	East Midlands	1	[1.00,1.00]	.
	East of England	1.12	[0.97,1.29]	0.1122
	London	1.33	[1.15,1.54]	0.0001
	North East	0.77	[0.65,0.93]	0.005
	North West	1.1	[0.95,1.26]	0.2045
	South East	1.02	[0.89,1.17]	0.8018
	South West	1.04	[0.89,1.20]	0.6314
	West Midlands	1.09	[0.95,1.25]	0.2338
	Yorkshire and Humber	0.92	[0.79,1.07]	0.2992
Deprivation quintile	1. Least Deprived	1	[1.00,1.00]	.
	2	1.07	[0.96,1.18]	0.2163
	3	1.14	[1.01,1.30]	0.0379
	4	1.26	[1.07,1.49]	0.0062
	5. Most deprived	1.15	[0.96,1.40]	0.1364
	Models also controlled for wave, year, season (output not shown),			
	N	102927		

Generating weights to adjust for attrition.

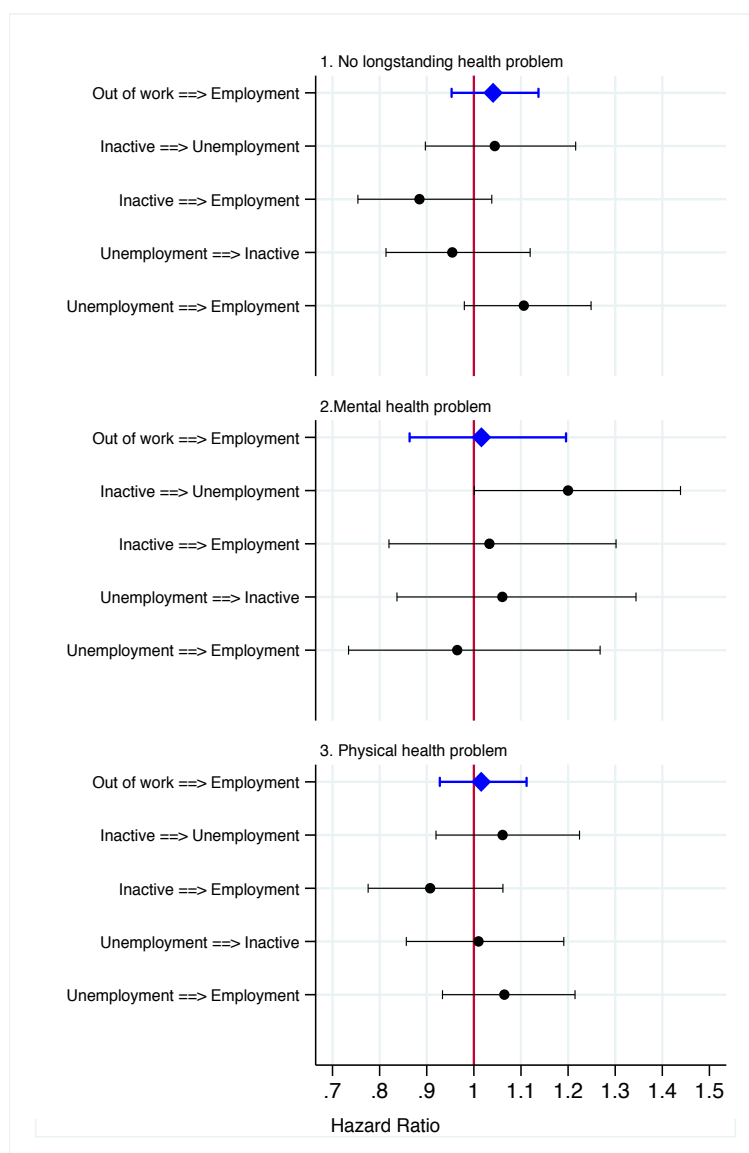
Analysis by the ONS has also reported that attrition from the QLFS tends to be higher in the 16 - 19 and 20 - 29 age bands, in households with 4 or more people, in

the unemployed and amongst those living London.⁴¹¹ Jones et al³⁷² outline a method for adjusting for attrition in panel surveys, particularly health related attrition. This involved estimating a logistic regression model for each wave of the panel from wave 2 to 5 with the outcome a variable indicating whether the respondent remained in the panel at that wave. Independent variables included the wave one values of variables that predict attrition. In this case we included, age, sex, labour market status, educational level, longstanding health problems, mental health problem, government office region, quintile of area deprivation (IMD), year and quarter. The models were used to predict the probability that the respondent remains in the survey at each wave. Inverse probability weights were calculated as the inverse of this. These were then used to weight the observations in the regression model. Essentially this gives greater weight in the analysis to respondents who have a high probability of dropping out of the panel, as they are under-represented in the observed sample. The analysis using these weights only includes those respondents who were interviewed at wave one; it excludes respondents who entered the panel at later waves.

There are a number of advantages of using these weights rather than the published longitudinal weights for the QLFS. Firstly they are specific to our regression models and specifically designed for the outcome of interest (employment amongst people with health problems) and address health-related non-response; secondly they allow the analysis to use a larger unbalanced panel whilst the published longitudinal weights are only available for the balanced panel which is much smaller; thirdly they allow the analysis to be adjusted for attrition from the panel due to non-response to specific variables used in our analysis as well as interview non-response. The figure below shows the results from these models, indicating that our results are not substantially changed when taking into account attrition.

Figure 41. Results of models using inverse probability weights adjusting for attrition. Hazard Ratios (HR) indicating the change in the labour market

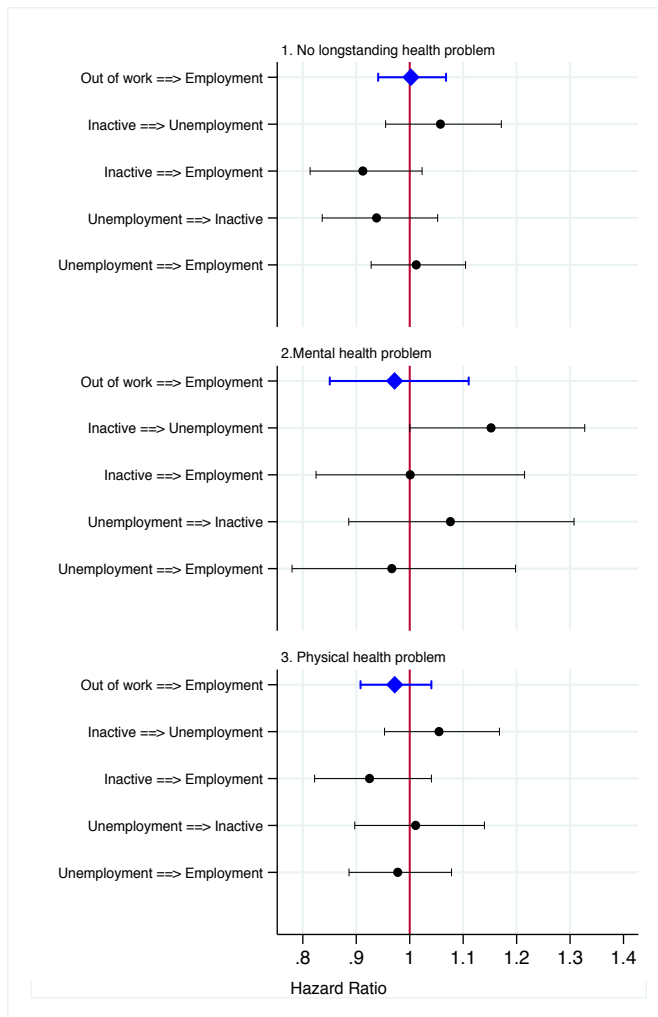
transition probabilities associated with each additional 1% of the working age population experiencing reassessment in the area.



2. Models using the fit-for-work rate.

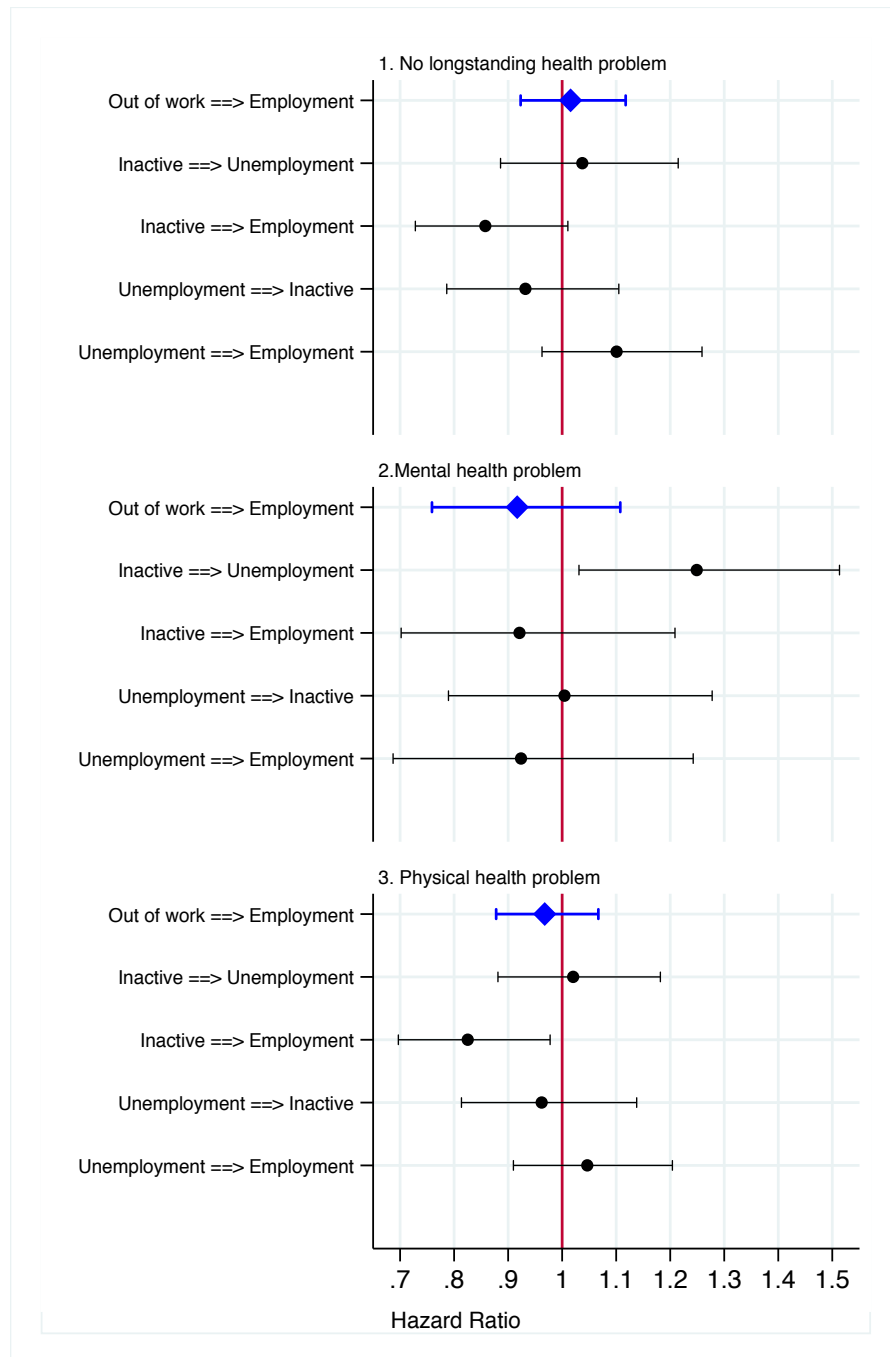
We investigated whether our findings were similar using the fit-for-work rate rather than the reassessment rate. As on average 24% of those assessed were found to be fit-for-work, the hazard ratios are presented as the increased risk of transition for each 0.24% of the working age population found to be fit-for-work, in order to make them comparable with those showing the association with the reassessment rate.

Figure 42. Hazard Ratios (HR) indicating the change in the labour market transition probabilities associated with each additional 0.24% of the working age population found fit-for-work the area.



3. Models excluding proxy responses

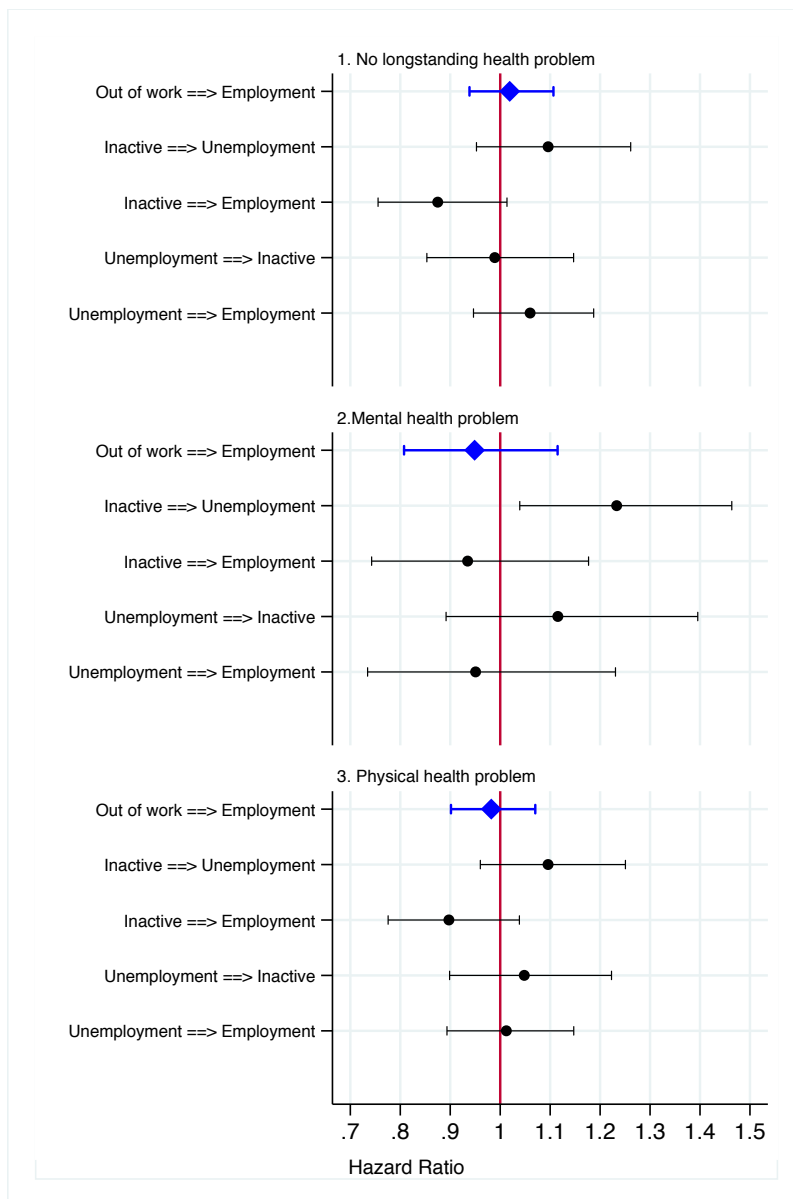
Figure 43. Results of models excluding proxy responses. Hazard Ratios (HR) indicating the change in the labour market transition probabilities associated with each additional 1 % of the working age population assessed.



4. Models adjusted for interview mode.

To adjust for any bias related to interview mode (telephone vs face to face), we added an control variable for interview mode and an interaction term between this and the reassessment rate and estimated the average marginal effects across both interview modes, controlling for any confounding effect of interview mode.

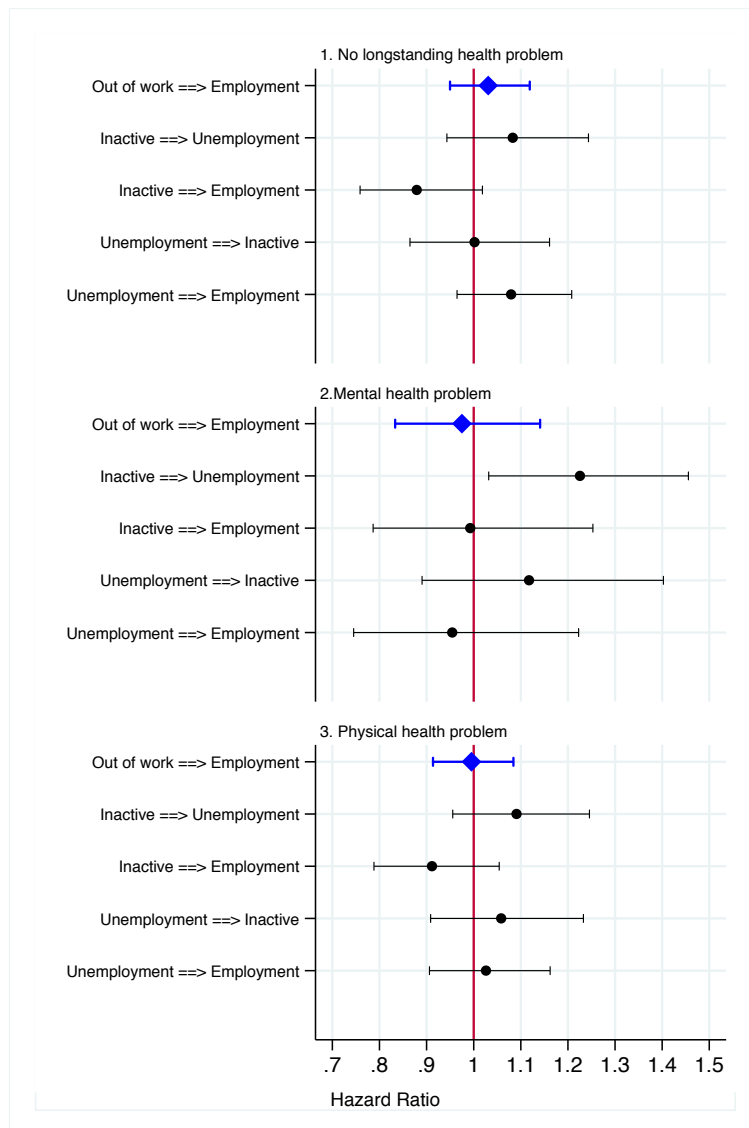
Figure 44. Results of models adjusted for interview mode. Hazard Ratios (HR) indicating the change in the labour market transition probabilities associated with each additional 1 % of the working age population assessed.



5. Models with alternative controls for education.

We investigated whether using three categories of educational attainment rather than years of education as a control variable influenced our results. Three categories of educational attainment were derived, (1) Degree or higher education, (2) GCE, A-level or equivalent, GCSE grades A*-C or equivalent and (3) No qualifications or other qualifications. This variable had relatively high levels of missing data (8%)

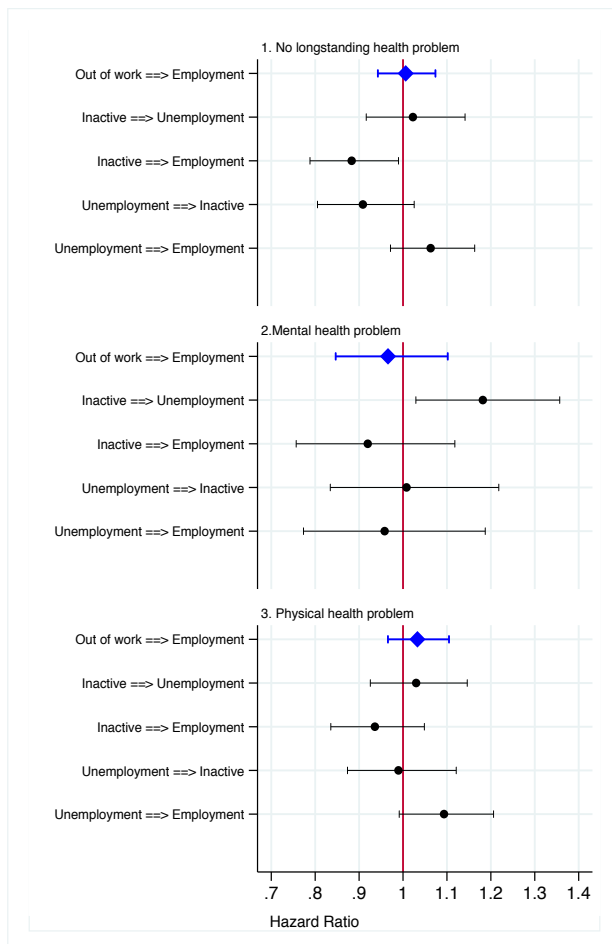
Figure 45. Hazard Ratios (HR) indicating the change in the labour market transition probabilities associated with each additional 1 % of the working age population assessed. – Alternative controls for education.



6. Models adjusting for pre-existing trends by educational group

Bias could result if associations (or a lack of association) between the reassessment policy and transitions into employment were actually due to differential pre-existing trends by socioeconomic group, that started before the onset of the policy.³⁰⁹ To investigate whether this was the case we estimated models including data from 2004 to 2013, with separate time trends by educational group which we allowed to vary in the period prior to the economic crisis (2004-2007), during the economic crisis (2008-2010) and after the economic crisis (2011-2013).

Figure 46. Hazard Ratios (HR) indicating the change in the labour market transition probabilities associated with each additional 1 % of the working age population assessed - adjusting for pre-existing trends by educational group.



7. Analysis investigating association between reassessment rate and trend in unemployment benefit receipt in each local authority area.

We investigated whether local trends in the reassessment rate were associated with local trends in the quarterly unemployment benefit claimant rate (Job Seekers Allowance) in each local authority. It is expected that many of the people who were found to be fit-for-work during through the reassessment process would move onto unemployment benefits. This was in part the intention of the policy as outlined in the DWPs own impact assessment and is assumed to have occurred by the Office for Budget Responsibility (OBR) in its forecasts of welfare budgets.^{50,291} We investigate the extent to which this happened by analysing the association between local trends in the reassessment rate and local trends in the unemployment benefit claimant rate, whilst controlling for other confounding factors.

This analysis used a panel of aggregate quarterly data including all the area based variables used in our main analysis along with the quarterly unemployment benefit claimant rate for 149 local authorities between 2010 quarter 1 and 2013 quarter 1 (i.e the same time period as our main analysis). We then used a fixed effects regression model to investigate the association between local trends in the reassessment rate and local trends in the unemployment benefit claimant rate. By including a fixed effect (i.e dummy variable) for each local authority, we effectively control for all differences *between* local authority areas, so that our models assessed the association between the trend in the reassessment rate and the trend in the unemployment benefit claimant rate within each local authority.²³¹ We also included the same area level controls as used in our main analysis. Specifically we estimated the following model:

$$\text{Model 1: UNEMP}_{i,t} = \beta_1 \text{REASSESS}_{i,t} + \beta_2 \text{GVA}_{i,t} + \beta_3 \text{MDQ}$$

$$B_4 + \text{YEAR} + \beta_5 \text{SEASON} + \text{CONS} + \mu_i + \varepsilon_{i,t}$$

Where:

$\text{REASSESS}_{i,t}$ is the reassessment rate in quarter t in local authority i

$\text{UNEMP}_{i,t}$ is the unemployment (JSA) claimant rate in local authority i in quarter t .

GVA is the Gross Value Added in £1000's for the region including local authority i in time t .

IMDQ_i is the quintile of deprivation of local authority i .

Year is a set of dummy variables for each year.

SEASON is a set of 4 dummy variables for each season.

μ is a set of local authority dummy variables

CONS is a constant.

$\varepsilon_{i,t}$ is an error term

Table 45. Results of fixed effects regression of the quarterly local authority reassessment rate on the unemployment benefit claimant rate between 2004 Q1 and 2013 Q1.

Variable	Coefficient	95% CI	P
REASSESS	0.26	[0.20,0.31]	<0.001
GVA	-0.04	[-0.06,-0.02]	0
SEASON.1	0	[0.00,0.00]	<0.001
SEASON.2	-0.29	[-0.32,-0.27]	<0.001
SEASON.3	-0.28	[-0.31,-0.25]	<0.001
SEASON.4	-0.39	[-0.42,-0.35]	<0.001
YEAR	Output not shown		
<i>IMDQ*PERIOD</i>	Output not shown		
N (LA years)	5513		
r ²	0.94		

7.5 Appendix. - Summary statistics

Table 46. Study 6 - Summary statistics - Individual QLFS data

QLFS	Proportion of sample / median.	% Missing
No longstanding health problem	47%	0.30%
Physical health problem	46%	
Mental health problem	7%	
Age (median)	49	0
Men	34%	0
Low Education	53%	0.4%
Number of quarters since last employment (median)	23	1.3%

Table 47. Study 6 -Summary statistics - Aggregate local authority data

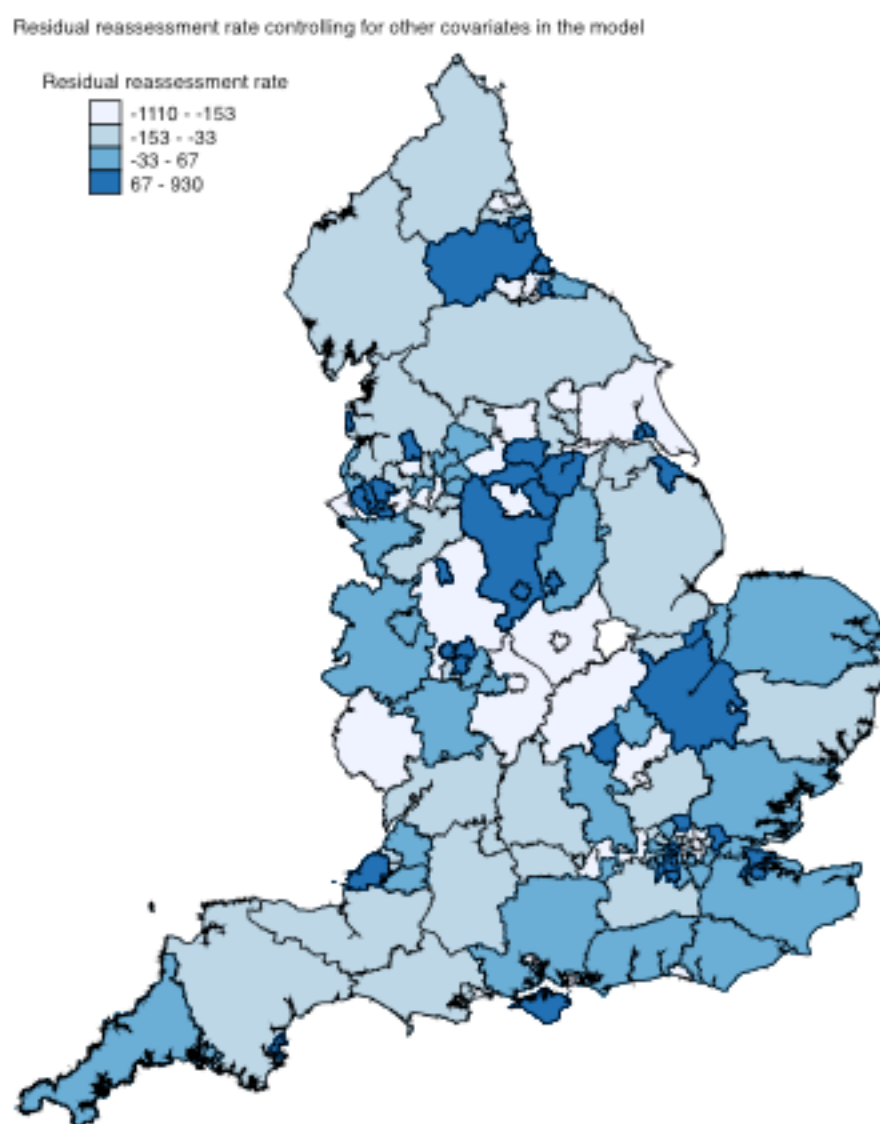
Local authority data	Mean	Min	Max	% missing
Reassessment rate	2.4	0.7	5.4	0
% on out of work disability in Q1 2010 (Incapacity Benefits)	3.7	1.4	7.7	0
GVA (£ per head)	24536	12482	135888	0

7.6 Appendix. - Investigating variation in reassessment trends.

To make causal inferences about the association between the reassessment rate and trends in employment transitions, we need to assume that the variation in local trends in the reassessment rate conditional on other covariates in our model was not associated with other causes of trends in employment transitions during this time. In other words we assume that the variation is as good as random. There are a number of reasons that might account for variation in trends in the reassessment rate across local areas. Firstly there is the targeting of the programme at more deprived areas and regions with higher levels of people on out of work disability benefits, secondly there are logistical, human resource and planning considerations that affect variation in implementation of any large-scale operation. The first of these we control for by including baseline receipt of out of work disability benefits, area deprivation and region. The remaining variation is therefore likely to be due to these logistical, human resource and planning considerations. We know that there was considerable variation in the implementation process, with some assessment centres progressing at a slower rate than others – leading to a large backlog of assessments at some centres. Reports of the reasons for this variation include, technical problems, under estimates of referral rates and the time involved in carrying out assessments when planning resources and problems with recruiting staff ^{63–66,310}.

To further investigate this variation in reassessment rates we estimated a model with the reassessment rate as the outcome, and included all the other variables in our model as independent variables. We then mapped the average residuals from this model for each local authority area in England to investigate the geographical pattern of the variation in the reassessment rate that was not explained by our control variables. (see Figure below). This indicates the variation in the reassessment rate after accounting for the control variables in our model. There is no obvious spatial pattern to this variation.

Table 48. Study 6 Average residuals from model of reassessment rates by local authority area.



7.7 Appendix. - Investigating the power of the analysis.

We investigated whether our main analysis had sufficient power to detect an effect of the reassessment process on transitions into employment. The statistical power of the analysis to detect a particular effect size will depend on the sample size within

each local authority, the overall sample size of the pooled dataset, the amount of variation in the reassessment rate between local authorities and correlations between these and control variables. We estimated the power of our analysis given these constraints by replicating the analysis in 5 simulated scenarios where the 'true' effect size of the policy were Hazard Ratios of 1.03, 1.06, 1.08, 1.10, and 1.11. These indicate the relative increase in the chances that people with a longstanding health problem had of entering employment associated with each additional 1 % of the working age population assessed in an area. The absolute effect implied by these relative effect sizes was also calculated in terms of the proportion of those reassessed who would have entered employment due to the reassessment in each scenario. These are shown in table 49. In other words if 18% of those reassessed entered employment over the three years as a result of the policy this would have resulted in a Hazard ratio of 1.11

We then estimated the statistical power of our analysis at the 5% levels 10% levels for each of these effect sizes by replicating the analysis on simulated datasets for each of these 5 scenarios.⁴¹² We simulated 100 datasets for each scenario. The datasets were identical to the dataset used in our analysis except that we randomly generated the outcome (transition into employment) such that its true association with the reassessment rate was the specified effect size. All other distributional parameters, variances and covariances were as in the original data. We then replicated our analysis on each dataset and identified the proportion of results that had p-values < 0.1 and <0.05 in each of these simulations. This gives an estimate of the statistical power of our analysis at each of these 5 effect sizes i.e the probability we had of finding a significant association between the reassessment rate and transitions into employment if the specified effect size was in fact the true effect size.

The results are shown in table 49. If the reassessment process had resulted in 18% of those being reassessed moving into employment over the 3 years of our analysis, this would have resulted in a HR of 1.11 and we would have had an 91% chance of detecting that effect with a p-value of <0.05. This is a plausible effect size given that the DWP has reported in a follow up survey carried out 12 months after people had completed a WCA that 18% had moved into employment.³⁶⁷

If the effect was smaller and only 13% moved into employment we would have had a 63% chance of detecting that with a p-value of <0.05. and a 71% chance of finding an effect with a p-value of <0.1. If the effect of the policy was even smaller i.e below 10% our analysis would have been quite underpowered, with a relatively high chance of not detecting an effect with a p-value of less than 0.05 or 0.1.

Table 49. Study 6 -estimates of statistical power under a range of hypothetical effect sizes.

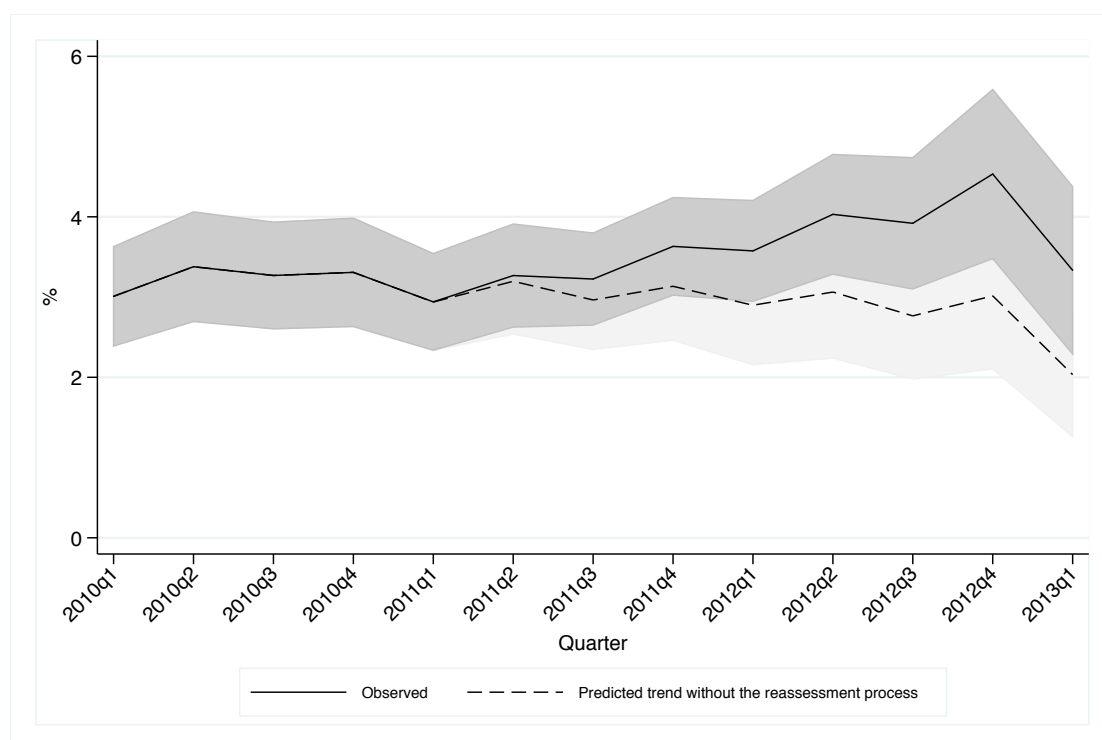
Scenario	True Effect Size	Power (at $\alpha = 0.05$)	Power (at $\alpha = 0.1$)	Total number of additional people with longstanding health problems entering employment due to reassessment.	Estimated % of those reassessed who would need to have entered employment due to reassessment. for each effect size.
1	1.03	17	21	39506	5%
2	1.06	30	47	79680	10%
3	1.08	63	71	106829	13%
4	1.1	75	87	134270	16%
5	1.11	91	93	148098	18%

7.8 Appendix. - Trend in the quarterly percentage of inactive people with a mental health problem who entered unemployment,

Figure 47 shows the absolute rate at which inactive people with a mental health problem entered unemployment estimated from the multinomial model and the predicted trend that would have occurred in the absence of the reassessment

process. By multiplying these estimates to the estimated number of people inactive with a mental health problem, we calculate that the reassessment process was associated with an additional 35,840 people out of work with a mental health problem entering employment. (95% CI 5493 to 66187).

Figure 47. Trend in the quarterly percentage of inactive people with a mental health problem who entered unemployment, and the predicted trend in the absence of the reassessment process, England, 2004-2013. (grey shading shows 95% CI)



7.9 Appendix. - Defining mental and physical mental health problems in the Quarterly Labour Force Survey.

In the labour force survey respondents are first asked:

Do you have any health problems or disabilities that you expect will last for more than a year? [LNGLIM]

They are then later asked:

Which of these is your main health problem/disability? [HEALTH]

- 1 problems or disabilities (including arthritis or rheumatism) connected with your arms or hands?*
- 2 ...legs or feet?*
- 3 ...back or neck?*
- 4 difficulty in seeing (while wearing spectacles or contact lenses)?*
- 5 difficulty in hearing?*
- 6 a speech impediment?*
- 7 severe disfigurements, skin conditions, allergies?*
- 8 chest or breathing problems, asthma, bronchitis?*
- 9 heart, blood pressure or blood circulation problems?*
- 10 stomach, liver, kidney or digestive problems?*
- 11 Diabetes?*
- 12 depression, bad nerves or anxiety?*
- 13 Epilepsy?*
- 14 severe or specific learning difficulties?*
- 15 mental illness or suffer from phobias, panics or other nervous disorders?*
- 16 progressive illness not included elsewhere (eg cancer not included elsewhere, multiple sclerosis, symptomatic HIV, Parkinson's disease, Muscular Dystrophy)?*
- 17 other health problems or disabilities?*

- We defined respondents as having no longstanding health problem if they answered no to the first question [LNGLIM].
- They were defined as having a mental health problem if they answered yes to the first question [LNGLIM] and were coded as 12 or 15 in their responses to the second question [HEALTH].
- They were defined as having a physical health problem if they answered yes to the first question [LNGLIM] and were *not* coded as 12 or 15 in their responses to the second question [HEALTH]

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